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ABSTRACT

Would use of silent concept loop films (SCLF) facilitate the acquisition of manipulative occupational skills for nonacademic students? What is the effect of SCLF on the teaching-learning climate? An experiment was undertaken to find answers to these questions. The design used was the Post-test Only Group Design No. 6. The subjects were a sample of 42 vocational school-bound eighth and ninth grade students drawn from the population of students in five junior high schools. The same teacher was involved for the Teacher Only and the Teacher-Film treatment groups; the Film Only treatment group was supervised by a graduate student with no previous teaching experience. The major findings of the study were: (1) students acquired significantly more skill with Teacher-Film than with either of the other two treatments; (2) there was no significant difference in the acquisition of skill between Teacher Only and Film Only treatment; and (3) as measured by student conversation, shop climate tended to be more conducive to the acquisition of skill in the presence of the intervention. One of the recommendations made was that the feasibility of developing an ongoing Single Concept Instructional Materials Development Program as a function of existing school personnel should be investigated. (Author/RP)

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THE USE OF SIGHT SINGLE CONCEPT LOOP FILMS TO FACILITATE THE ACQUISITION OF OCCUPATIONAL SKILLS

[illegible]

A DISSERTATION

SUBMITTED TO THE FACULTY

OF THE GRADUATE SCHOOL OF EDUCATION

OF

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CHAPTER I

INTRODUCTION

This study constitutes the experimental phase of a four-part project. In Phase I, the developmental phase, the investigator made more than 100 silent single concept loop films in which manipulative skills in baking were demonstrated. In Phase II, one of these loops was tested with a small group of foods students (n = 15) at Middlesex County Vocational-Technical High School, Woodbridge, New Jersey. The results indicated that students who had access to the use of this medium tended to show greater acquisition of skill. Students also seemed to show greater interest and enjoyment in learning, but these variables were not evaluated.

The present study constitutes Phase III and was planned to overcome some of the shortcomings of the small study by: (1) involving a teacher other than the investigator himself, (2) using a greater number of subjects, and (3) using a number of films involving more basic skills than those called for in the original study.

Guidance counselors in five different junior high schools arranged for 42 vocational school bound students

to participate in three 3-day experiments from which the data were assembled. After preliminary tryouts at two schools, three different films in a single area--dinner roll making--were selected as being suitable for the experiment. These are the loops on which the study was based.

While the findings of this study suggest that the acquisition of occupational skills can indeed be facilitated with the use of silent single concept loop films and that this medium should be further investigated, many questions remain to be answered. Therefore, Phase IV is planned as a postdoctoral undertaking in which the investigator will use all of the available filmed cartridges in an actual shop-teaching situation for a full school year. Answers will be sought to such questions as: How well do the cartridged films hold up when handled day after day by different students? Can different outcomes be expected in the areas of motivation and the acquisition of skill when only one cartridge is available for the entire shop and different students are working on different projects at the same time, as compared with the experimental situation in which each student had his own cartridge and all students were working on the same project simultaneously? What will be the extent of student use of the films when the effect of novelty and the Hawthorne effect wears off?

What are some of the factors that affect the use of single concept films that were unforeseeable in the experimental situation?

General Statement of the Problem

The study was designed to answer the question: Can the use of silent single concept loop films (SSCLF) facilitate the acquisition of manipulative occupational skills for nonacademic students?

It has been shown that for nonacademic students many handicaps stand in the way of successful school learning. Among these are poor language skills, short attention span, and the classroom environment itself (Deutsch, 1963; Sears et al., 1957). Tuckman and O'Brien (1969) have pointed out that such handicaps can be rectified as a function of the educational situation.

It is reasonable to suppose that these same handicaps also stand in the way of the successful acquisition of manipulative occupational skills, and that these too can be rectified as a function of the educational situation.

The main problem of this study was to measure empirically the effectiveness of SSCLF as a medium for facilitating the acquisition of occupational skills by nonacademic students. In addition, the effect of SSCLF on the shop environment and on the allocation of teacher

time was also investigated.

Specific Statement of the Problem

The specific problem was to measure the effects of the intervention, *SOCIAL*, in three controlled vocational settings. The focus was mainly on a comparison of the productive output of three sample groups of nonacademic vocational school bound students under three different treatments: (1) Teacher Only, (2) Teacher + Film, and (3) Film Only.

Background of the Problem

It has never been demonstrated that literal skills, i.e., the ability to read and write, are necessary preconditions for the acquisition of manipulative skills. Yet, even in vocational schools where the primary objective is the acquisition of skills, the written word continues to be a favored mode for the presentation of instructional material. This, in spite of the fact that cognitive learning theorists fail to agree on any single learning theory, and that in the domain of psychomotor skills a useful taxonomy has not yet been formulated. There is no doubt, however, that some teaching methods and some classroom conditions foster learning (and/or the acquisition of skills) better than others. It is the opinion of the Commission on Instructional

Technology (1970) that the means for improving learning are at hand.

The Report to the President by the Commission states:

> . . . experience to date suggests that technology could help solve major instructional problems. . . . Cameras and recorders help dilute over-verbalism . . . and help make learning more individual and effective. . . .

This investigator recognized the problem of over-verbalism when he wrote in the preliminary proposal to this study in January, 1969:

> . . . it is believed the use of silent single concept film loops attack certain negative factors in the teaching-learning situation. If it were possible to bring occupational skills directly to the student without imposing on him the condition that he must possess certain literal skills, his chances for acquiring the occupational skills would be improved. . . .
>
> Moreover, many students resent being told what to do. The silent single concept film doesn't tell the student anything . . . it simply shows him how something is done. It is a teacher that doesn't "bug" him. . . .

The problem has many parts and the student himself is only a part of the problem. The changed learning environment is another part of the problem; so is the lack of usable learning theory. Still another part of the problem is the lack of funding.

McLuhan (1964) points out that traditional solutions cannot solve problems that grow out of a changed environment. He writes that before we can teach the

student we must reach the student. But to reach him, there must be reliance on something other than the book and on print in general.

Clearly, the student with poor reading and writing skills is a disadvantaged student. Whether he is disadvantaged for biological or socioeconomic reasons, or because he is merely a slow learner, the fact remains that he finds it difficult to acquire occupational skills by methods which are predicated on the assumption that he must first achieve a level of proficiency in literal skills; and literal skills must be differentiated from verbal skills. The latter are essential to learning; the former are merely manifestations of verbalization, i.e., reading and writing per se. While reading and writing facilitate learning, they are not essential to learning. Verbalization is essential, however. For example, to the extent that a mute understands what he sees and imitates it, he verbalizes. To the extent that a blind person understands what he hears and can do what he is told, he verbalizes. And to the extent that the vocational student can imitate a skill that is demonstrated, he too verbalizes even though not a word is spoken.

Learning from a demonstration is largely imitative learning. To be effective, a demonstration should be followed by immediate practice for it has been shown that

there is a correlation between the lapse of time after a demonstration and forgetting. Kennedy and Sheffield (1936) have shown theoretically and empirically the advantages of shortening the delay by providing opportunity for overt practice. Unfortunately, in a typical shop situation, it is usually not possible for all students to follow a demonstration with practice. Thus, time lapse, one of the major factors in forgetting, is one of the obstacles that must be overcome if the teaching-learning process is to be improved. Additional obstacles to learning are also inherent in the dynamics of the group and in student-teacher interactions as Tuckman (1969) and Amidon and Flanders (1967) have found. SDCLP is no panacea and cannot cure all the ills in the teaching-learning situation. But it is part of the rationale of this study that SDCLP attacks many of the negative factors referred to and can alleviate some of them to a significant degree.

Programs such as the Biological Sciences Curriculum Study (BSCS) and Physical Sciences Study Committee (PSSC) rest heavily on the use of SDCLP as part of a coordinated course of study, and research based on these programs tends to support the use of loop films (Cleaver, 1968). But very little research has investigated the effectiveness of this relatively new medium in a vocational shop setting. Moreover, relatively few loop films

are available that were designed specifically to be used as single concept films in an individualized instructional mode. According to Robert Heinich, Chairman of the Division of Educational Media, Indiana University, "... the vast majority are print-me-downs ... originally produced for sale as 16 mm. films" (NICEM, 1969). Of the more than 10,000 or so 8 mm. cartridges listed in the 1969 National Center Index to 8 mm. Motion Cartridges, only approximately 150 are listed under "Industrial Arts." Many are categorized "occupational" or "vocational." In the present study, the cartridged films were specifically designed for individualized instruction in a vocational school setting.

With regard to one other important part of the problem, cost, SSCLP has been found to be a comparatively inexpensive method for individualizing instruction (Diamond, 1965; Diamond & Collins, 1966). The problem of cost was not investigated in this study, however.

Hypotheses

The hypotheses formulated and tested as part of this study were stated in the null form as follows:

Hypothesis 1. There is no significant difference in the amount of manipulative skill acquired by students taught by the three methods, as measured by performance tests.

Hypothesis 2. There is no significant difference in the degree to which shop climate becomes more conducive to the acquisition of skill through the presence of SOCLF, as measured by student conversation during performance.

Hypothesis 3. There is no significant difference in the effectiveness of SOCLF for boys or for girls, as measured by performance tests.

Hypothesis 4. There is no significant difference in the degree to which SOCLF facilitates the acquisition of skill in a specific occupational area for students who have made an occupational choice in that area and students who have not, as measured by a performance test.

Hypothesis 5. There is no significant difference in the amount of individual assistance a teacher finds it necessary to provide, whether SOCLF is available or not.

Definition of Terms

Acceptable units. Acceptable units were simply well-made dinner rolls that were, in the opinion of two experts, comparable in appearance to samples made by students at another vocational school. Taste was not a factor.

Acquisition of manipulative skill. It was an assumption of this study that the acquisition of manipulative skills may be inferred from the number of acceptable units produced under specified conditions.

Pre-academic students. Students whose reading scores are at least one grade below the national norm for their age; or whose IQ's are below 100, according to existing school records.

Proof. A term used in commercial bakeries to refer to a large piece of dough, before and after it has been divided into 36 small equal size pieces of dough on a dough divider.

Silent single concept loop films (SSCLF). Fifty feet or less of silent cartridged color Super 8 mm. film in a continuous loop; used only with the Technicolor projector. Films range from 2-1/2 minutes to 3-1/2 minutes in length. The student operates the projector by himself without reducing room light in a self-instructional situation. Ideally, only a single skill is demonstrated on each cartridge. Also referred to as "loop films" or "film loops."

SSCLF method. The conditions under which SSCLF are used in a shop situation, namely: (1) that a projector is permanently installed at each work station for the sole use of one or two students; and (2) the cartridged films related to the skill to be learned at that station are available to the student at all times, except during test periods.

Super 8 mm film. Differentiated from 8 mm. film

in that Super 8 is characterized by a picture area 31% larger than 8 mm. Super 8 mm. film is produced to provide either magnetic or optical sound tracks, but in this study the reference is always to silent film.

Task. In this study, the three tasks were learning to make: (1) bottom rolls (B_1), (2) twist rolls (B_2), and (3) round dinner rolls (B_3).

Vocational bound students. Students still attending junior high school who may or may not have made a final step choice but who plan to enter the vocational high school, or whose guidance counselors recommend that they do so.

CHAPTER II

REVIEW OF RELATED STUDIES

There are literally thousands of studies having to do with motion pictures as an instructional medium. These include both silent and sound films and color as well as black and white. There are also innumerable studies involving the use of film strips coordinated with records and tapes. Recently a great many studies have appeared relative to the effectiveness of teacher-made video tapes and television learning. Between 1958 and 1963, the United States Office of Education financed over 1,000 studies in the area of audiovisual research. But relatively few of these deal directly with the effectiveness of silent single concept loop films. In a 1967 report, The State of Audiovisual Technology: 1961-66 (Godfrey, 1967), single concept loop films were not even mentioned. A 1969 report on AV equipment owned by United States public schools indicated that of 92,500 schools operating in 1969 slightly more than half own one 8 mm. projector.

There are also a great number of studies that deal with learning theory. Relatively few of these deal

directly with loop films as shaping, reinforcing, and motivational variables germane to the process of learning or acquiring manipulative skills.

In a sense, a generic bond exists between the present study and every previous study related to learning theory and motion pictures. In this study, the review of the literature has been limited to: (1) studies related to the broad area of films, because that is mostly what has been reported; (2) studies related to single concept loop films; and (3) studies in learning theory as it relates to the acquisition of psychomotor skills.

Studies Related to Films in General

An Office of Education report on almost 350 research studies concerned with motion picture film and instructional television (Reid & MacLennon, 1967) dealt with certain comparisons relevant to the present study. Among them were:

1. Comparisons of filmed or kinescoped courses with direct instruction.
2. Studies of attitudes related to instructional films.
3. Studies of effect of production variables in films.
4. Studies of other applications of films for instruction.

In the first area, they found that a relatively small number of studies have been concerned with comparison of learning from filmed courses, sometimes supplemented by a local teacher, with direct instruction.

While the general pattern of the studies surveyed by Reid and MacLennon evidenced that no significant differences have characterized many recent studies that have compared filmed courses with direct instruction, "films only" courses in one study took about 20% less time to complete and thus indicate potential usefulness of such film series as PSSC, BSCS, and the film produced for this study. They specifically suggest that

> . . . it might be desirable to conduct quality control experiments to determine whether the use of such film series had advantages over existing classroom methods. [They also suggest that] where difficulty is being experienced in securing qualified faculty in certain specialized subjects, effective learning can undoubtedly be stimulated by such film series, or series of video tapes produced by other institutions, supplemented by whatever local sources are available [p. 5].

The foregoing is precisely one of the problems with which the present study deals. In the second area (attitudes related to instructional films), they found:

> . . . few studies have been concerned with assessing attitude toward film as a medium for instruction . . . that students who believe the material to which they are being exposed will have early use . . . [and] tend to learn more than students who do not have these attitudes . . . thus pointing out that the personal relevance of instructional material to students may have an important effect on the degree to which material is learned [p. 13].

In the third area (effect of production variables on films), small but significant differences in learning were found when some production variables such as the following were investigated: (1) sound versus silent films

with teacher commentary; (2) motion pictures versus a series of still pictures; and (3) animation versus live photography.

With regard to color versus black and white, it was not found that this variable produced marked differences in learning. One of the conclusions of their survey was that there is not the slightest doubt that suitable films stimulate learning, but that no techniques have yet been discovered for consistently producing large differences in learning (p. 15).

Finally, with regard to the fourth section (other applications of films), it was indicated that much more research is needed as many new applications for films have been opened up by the development of special projectors and easy-to-load cartridges containing 8 mm. film loops--of which the Technicolor projector used in the present study is typical.

Hoban and Van Ormer (1950) reviewed research on film variables which exert influence on change in pupils. They found that learning from films and from other graphic presentations depends on three main sets of variables, namely:

1. Film Variables

   a. Length of the film.
   b. Density or amount of information per minute.
   c. Sound versus silent film.

d. Type of pictorial content--animation, live action, dialogue.
e. Use of animation devices for emphasis--arrows, labels, etc., superimposed on the picture.
f. Summary at end.
g. Provision for pupil participation.

2. Utilization Variables

a. Quality of the projection.
b. Prefilm treatment (introductory statement by teacher or experimenter).
c. Postfilm treatment (e.g., class discussion).
d. Number of repeated showings.
e. Intervals between showings.
f. Timing the film to other materials of importance.
g. Time of day and place of showing.

3. Pupil Variables

a. Level of intelligence as measured by a standard test.
b. Grade level.
c. Reading comprehension.
d. Familiarity with the type of subject matter in the film or previous instruction on the topic of the film.

However, before any of these variables can influence learning, they point out that there must be teachers who use the films. It is one of the attributes of DSCLF that dependency on teacher use can be overcome when conditions which foster student use are provided.

Saban and Van Ormer formulated ten principles that indicated the nature of the influence of the motion picture. Number 1, the Principle of Visual Literacy, states:

> The influence of a motion picture is primarily in the strength of the visual presentation, and secondarily, in the narration or commentary. It is relatively unaffected by "slickness" or production as long as meaning is clear.

This supports the investigator's own findings that, in spite of inevitable flaws in nonprofessional teacher-made films, students respond well to them.

May and Lumsdaine (1958) point out that previous research indicates that films have a great unrealized potential as teaching materials. The studies cited found:

1. With some films, pupils learn faster and remember a body of subject matter longer than when the same material is presented only verbally.

2. Films have been used successfully to facilitate thinking and problem solving.

3. Other films have motivated the further study of a topic.

In essence, they point out that the basic condition for the acquisition of knowledge from a film is the evocation of certain kinds of verbal responses. What must be made clear here is that the imitation of certain physical movements presupposes a kind of verbal response, however silent.

In a study of the factors related to the obstacles to the use of motion pictures by school teachers, Couch (1941) reported:

Relation of Use of Films to Obstacles
to Audiovisual Education

Percent of teachers who reported that:	Severe	Moderate	Non-severe
1. They could seldom get a film when they needed it	16.5	28.5	21.0
2. They were disappointed at least once during the year for failure to get an ordered film when it was needed	40.0	38.5	21.0
3. It is hard to find films that fit lesson plans	21.0	28.0	64.4
4. It takes a great deal of time to locate needed films	8.0	13.4	29.0
5. It takes too much time to preview films	10.5	15.0	21.6

Today, almost 30 years later, the same obstacles persist.

Studies Specifically Related to Single Concept Loop Films

In a study designed to test experimentally the "effectiveness" of three teaching techniques, one of which involved the use of single concept films with supplementary study guides, Kruppa (1968) found that there was no statistically significant difference at the .05 level in the amount of technical knowledge acquired, or in performance among the groups by the various methods, but there was a significant difference at the .001 level between sub-groups of the treatment when comparing the teacher time required for giving individual demonstrations.

Calder (1967), in an experiment to compare five

self-instructional methods to teach operation of a 16 mm. projector, three of which involved the use of SSCLF and slides, found no significant differences among the five methods on a performance test. In neither of these two studies was SSCLF used alone, however, as they were in the present study.

Diamond (1961) explored the use of SSCLF in developing the ability of future physical education teachers to recognize tennis errors. He found: (1) when designed specifically for the purpose, the 8 mm. cartridge film is an effective tool for developing error recognition skills in future physical education teachers (in this experiment, there was a significant increase in errors correctly identified with a concurrent significant decrease in the percentage of wrong identifications); (2) the approach is particularly effective when students are not experienced in the particular sport being taught; (3) the 8 mm. cartridge film is both simple and inexpensive to produce; and (4) errors can be clearly shown by this process, particularly when slow and stop motion are used.

Diamond and Collins (1966), in a study of the use of 8 mm. loop films to teach the identification of clarinet fingering, embouchure, and hand position errors, found substantially similar results. The students were generally favorable to this approach with two reservations: 30%

would have preferred better viewing conditions and a larger image size. There was also a request that more descriptive information be included, perhaps on a sound track. They concluded: (1) when designed specifically for the purpose, the 8 mm. cartridge silent film is an effective tool for developing recognition of errors in clarinet fingering, embouchure, and hand positions; (2) this technique, while effective with students of varying experience, is most effective with those students who have had some prior instruction on the instrument; and (3) films of this type are inexpensive, simple to produce, and easy to use.

In a study on the retention of film content under conditions of student selection and individual viewing (two conditions which are imperative to the SSCLF method), Cowgar (1968) found that students who viewed a film individually and independently from classroom activities retained a significantly important amount of factual content 30 days after viewing.

In a pilot study to develop a model instructional program for the teaching of biological concepts using single topic films, Cleaver (1968) found trends toward improvement of pupil performance and change in teacher behaviors resultant from the films. It must be noted that here again the films were supplemented with SSCS

guides and constituted an adjunctive medium. And at San Jose College, a miniature self-instructional system using 8 mm. cartridge films has been developed and was applied in teaching audiovisual techniques. This method proved that for many "how-to-do-it" and informational topics, college students can use media to learn successfully by themselves. The 8 mm. methods developed for audiovisual production and equipment operation techniques have been extended to teaching the operation of keypunch machines, industrial arts woodshop and craft skills, use of advanced chemistry laboratory equipment, and occupational therapy practices.

Learning Theory as It Relates to the Acquisition of Skills

May (1946) investigated the psychology of learning from demonstration films. He described learning from a demonstration as a case of learning by "delayed imitation" in contrast to learning by "immediate imitation," as in the case of a soldier who, during a demonstration on how to clean and oil a rifle, has a rifle in his hand and imitates step by step the sequence of acts of the demonstration.

The psychological principles involved are described by Miller and Dollard (1941) who showed that learning by imitation is not primarily an instinctive

process but is acquired by previous training. The child first must learn to imitate. Imitation itself is comprised of two processes: (1) "copying," the process by which unit skills are acquired under the tutelage of a person who possesses them; and (2) matched-dependent behavior, a process of discrimination as to which behavior to imitate.

Miller and Dollard point out that imitation is a step in the process of becoming an independent learner. Not until the subject has acquired certain basic skills by copying can he go on to use those skills without the demonstrator. This calls for being able to make the correct sequences of responses to certain external cues. The observer learns only what he actually does in response to the demonstration. The type of response most beneficial in learning to perform the skill itself is formulating silent verbal directions for the steps in the process, according to Miller and Dollard.

Thompson (1944), in observing the role of verbalization in learning from demonstration, found that children learn fastest when they are encouraged and aided in making (silent) verbal discriminations. She also found that learning is slowest when the inner speech of the observer is broken up or hampered.

On the whole, very little research has been done

on motor skills during the past decade and systematic experimentation with facilitation of motor-skill learning is not being reported according to Klausmeier and Davis (1968). Rather, analogies are being drawn with verbal learning. They point out that in the field of motor learning and motor behavior, the definition of the field is by no means easy to accomplish for where learning, per se, and motor skills, per se, overlap is difficult to say. One thing is clear, however: a serviceable basic concept of motor skill learning is lacking.

Irion (1966) distinguishes between three periods of research in skill acquisition: 1890-1927 (8%), 1927-1945 (17%), and 1945 through the end of his study, 1965 (75%). More than half of all the research done in this area was done during the last period. He also points out that most of the work has been done by a relatively small number of investigators and that this group was remarkable for the homogeneity of its systematic viewpoint, for, for the most part, they have been behaviorists.

Considering each of the three periods in turn, early workers such as Jost (1897) demonstrated the relatively greater efficiency of distributed over massed trials. Other studies reviewed by Ruch have shown: (1) that long rests are superior to short rests, and (2) that short practice sessions between rests yield

better scores than do long practice sessions. Both of these findings would seem to have considerable implications for teaching manipulative skills with films.

Recent studies related to learning manipulative skills have been largely concerned with fragmenting practice per se into massed or distributed variables and the correlation of rest with learning and performance. Kientzle's (1946, 1949) studies imply that the effects of rest and the effects of practice represent separate entities. Kientzle's studies were followed by a number of studies that investigated reminiscence as a phenomenon affecting the learning of manipulative skill. Ammons (1947) varied the amount of pretest practice. Kimble and Horenstein (1948), investigating further Hull's theory of reactive inhibition, found reminiscence to be a function of length of rest and to provide a fairly good fit with Hull's function for the decay of reactive inhibition in time.

With regard to the nature of the inhibitory process, Ammons and Willig (1956) and Digman (1959) independently arrived at the conclusion that conditioned inhibition plays a negligible role in motor performance. And Bilodeau (1952), using a cranking situation in which learning factors were kept to a minimum thereby allowing inhibitory factors to be revealed in relatively "pure"

form, also corroborated this finding. Thus, it would seem that in a preponderance of studies the conclusions tend to suggest that distribution of practice affects performance but not learning. It must be noted, however, that there are those who suggest the opposite: that massing and distribution variables affect learning rather than performance (Bourne & Archer, 1956).

The issue of massed and distributed practice continued to be a dominant theme during the third period, led by Hull's (1943) introduction of the concepts of reactive inhibition and conditional inhibition, and by Ammons' theoretical analysis that was specifically designed to be applicable to the skill-learning situation. What is significant here is that the work of this period brought about a change in thinking, i.e., distribution of practice affected performance rather than learning, a view that had been advanced by Doré and Hilgard (1938). Here again the findings are not unequivocal. Archer (1958) hypothesizes that inhibitory factors accumulated during massed practice produce a competing response that interferes with performance and prevents the learning of correct responses to some degree.

Irion and Gustafson (1952) and Kimble (1952), investigating the phenomenon of reminiscence in bilateral transfer, found that improved performance was a function

of rest, which argues for distributed rather than massed practice. And Grice and Reynolds (1952) demonstrated that length of rest period affected reminiscence also.

What this seems to mean in terms of the present study which aims toward providing the student in the shop with a variety of new skills--and yet, at the same time, must intersperse this new learning with practice of previously learned skills--is that the scheduling of such learning and practice cannot depend solely on the teacher's insight if a model is to be developed for shop teaching which brings together into an empirical framework activities consistent with valid theory.

Another important aspect relative to the student's having the demonstrator at his beck and call with the flip of a switch is the aspect of vicarious learning. Kanfer and Duerfeldt (1967) investigated the effects of vicarious learning in a paired associate nonsense syllable task under conditions of model competence, varied subject competence, and varied numbers of vicarious trials. The results suggested that while vicarious trials late in acquisition had a disruptive effect, early vicarious exposure yielded benefits similar to those of direct reinforcement trials.

Their finding that Ss derive more benefit from observational learning during the early rather than the

later stages of their attempts to master a task clearly suggests that the efficient use of such techniques as motion pictures or demonstrations as training aids is dependent upon the time of presentation.

The fact that no differences were found between the direct learning and either of the early observational learning groups supports past findings (Berger, 1961; Kanfer & Marston, 1963) that observation of a model can effectively replace much of the trial-and-error learning typically utilized in developing task mastery.

CHAPTER III

METHOD

Selection of Subjects

All of the vocational schools within a reasonable distance from the University were evaluated as to their suitability for the study and the willingness of teachers and administrators to participate. In some cases teachers and administrators were reluctant to become involved in anything that might interfere with the day-to-day program; in others, the physical facilities were not suitable. In addition, it was necessary to find schools in which there were vocational school bound junior high school students who could be released to participate in the experiment for three consecutive half days. Five junior high schools were found from which samples could be drawn.

Guidance counselors at the junior high schools were asked to select participants for the experiment and to include both black and white Ss with approximately equal numbers of boys and girls. It was planned to have three groups of 15 each. In one group, however, there were only 12 Ss. The relatively small sample size was not considered a detriment in view of the fact that 45

students in a vocational shop situation approaches the ideal. Borg (1963) states that, in many educational research projects, small samples are more appropriate than large samples.

The possibility of sampling bias by self-selection was precluded since none of the students who were to participate in the study actually volunteered and all were given the option of not participating. So did not know anything about the experiment until they were actually oriented at the first session. Prior to this they had been told only that since they were, for the most part, planning to attend the vocational school where hand skills were an important part of the instruction, they were going to be given the opportunity to learn a new hand skill in a vocational setting, and that they would later be asked some questions about the method of instruction. They were also informed that they would not be "marked," nor would their chances for acceptance in the vocational school be jeopardized in any way.

Se for the control group, Teacher Only (T_1), and one experimental group, Teacher + Film (T_2), were randomly assigned from the same four junior high schools. The second experimental group, Films Only (T_3), while homogeneous with the other two groups on the measures of sex, race, school achievement, and vocational school bound, came from

a different school in another school district. These Ss were 14-year-old eighth graders bound for a four-year vocational school while the other two groups were 15-year-old ninth graders bound for a three-year vocational school.

Evaluation and Design

The design was analysis of variance for factorial design. When an F test showed significant differences among the treatments, a Tukey's test was used to find where the differences were. In this test, group sizes need not be equal (Edwards, 1960; Winer, 1962).

It was expected that T_2 would be superior to T_1 and T_3 at the 0.05 and 0.01 levels, respectively, but that there would be no significant difference between T_1 and T_3.

Teacher treatment is described in the model below:

Teacher "A"		Teacher "B"*
Group I	Group II	Group III
X_1	X_2	X_3
X_1	X_2	X_3
X_1	X_2	X_3

where X_1 = Teacher Only (T_1) X_2 = Teacher + Film (T_2)

X_3 = Film Only (T_3) N = 42

$H_0 = u_{M_1} = u_{M_2} = u_{M_3}$ H_1 = Not all equal

*Teacher "B" was a non-teacher, i.e., simply someone in the shop to fulfill the legal requirement that students must be supervised.

Independent Variables

The silent single concept films used at three different levels constituted the independent variable.

1. Teacher Only (T_1).

2. Teacher + Film (T_2).

3. Film Only (T_3).

Dependent Variables

The dependent variables were:

1. Group means of student achievement as measured by the acceptable units (dinner rolls) produced in performance tests.

2. Teaching-learning climate as measured by student conversation and teacher behavior.

Measures to Insure Validity

It was important that some motivational device be designed to assure that all Ss would be present for the entire three days of the experiment, particularly in view of the high absence rate for low achieving students. Accordingly, all students were told they would be permitted to take home the rolls they made during the practice period. Each day these were packaged and ready to be picked up at dismissal time.

Ss were told they were not being tested or graded. However, as is usual in any teaching situation, Ss were

given daily feedback as to their percentage of acceptable rolls on the previous day. Since this was true of all treatments, it may be assumed that the reinforcement effect of feedback was equally distributed.

Reliability and Interjudge Compatibility

One judge, the Executive Secretary of the New Jersey Bakers Board of Trade, was a constant throughout the experiment. The second judge, a professional chef, was unable to continue with the study after the third day, and was replaced by a local former bakery owner. The reliability of the judges was established in the following manner:

A large number of samples similar to the three varieties of rolls to be used in the experiment were baked by the students at a nearby vocational high school. From these, the baking teacher was asked to select 100 rolls from each variety, only half of which were to be acceptable according to criteria established for this study. The investigator eliminated those rolls which he thought were too nearly alike for fine discrimination or too different for gross discrimination, leaving 66 of each variety--half acceptable and half unacceptable. Those which were considered unacceptable were identified on the bottom with an "x." The testing procedure consisted of three "rounds" during which each judge independently judged each

variety three times. The procedure was as follows:

1. Each variety of 66 rolls was dumped into a basket.

2. From each variety the investigator randomly selected 33 rolls and placed them face up on a sheet pan. Then the first judge was called in to select the acceptable rolls and place them face up on another pan. All of the rolls on both pans were turned bottom side up and scored.

3. After scoring, these same rolls were again placed face up and the second judge was called in for his evaluation.

4. This procedure was repeated for the second variety; then for the third variety. This constituted the first "round." After each round, the 33 roll sample was thrown back and another 33 roll sample drawn from the full 66. Thus, both judges had the opportunity to judge the same three similar samples of each variety three times. Regardless of the mix of acceptable and unacceptable rolls in any given batch, it was considered that each judge had to make 33 choices (32 in the case of one variety). Testing took about an hour and a half.

Analysis of variance and chi-square were used to determine interjudge compatibility. Scores for both sets of judges appear in Chapter IV, Tables 3 and 4.

The Pretest

The original design for this study called for a pretest to determine the degree to which students might already possess the skills involved. Accordingly, such a procedure was included in the Newark preliminary study. Students were given a baked sample and three pieces of dough, and asked to copy the sample. It was expected that those who would not be able to do so would be motivated by this procedure. The effect was quite the opposite. Ss were frustrated by their failure. It was decided that in the main study it would be better simply to ask whether Ss had made this type of roll before rather than expose them to failure. As it turned out, in no case were there any Ss who could make the kind of rolls that constituted the tasks for this study. It could be assumed, therefore, that the lack of skill was randomly distributed and that final scores would constitute a valid measure in a post-test design.

Correlation Between the Present Study and the Three Preliminary Studies

While the experimental study could not have been run without the preliminary studies (three days at the New Jersey Residential Center, four days at Middlesex County, and three days at the Essex County Vocational School), none of these were considered pilot studies in the sense

that they were replicated by the final nine-day study.

The work at the Residential Center served as a tryout for actual films to be used later; the Essex County study involved the Films Only (T_3) treatment and the Middlesex County study was a pilot for the T_1 and T_2 treatments, but with a different film involving different techniques. For one thing, there was not sufficient homogeneity between the groups in the preliminary studies. The boys at the Residential Center were close to 20 years of age and for the most part had been out of school for a number of years. Furthermore, only two projectors were available for 10 students at that time so it can hardly be said that individualized instruction prevailed. As for the Essex County and Middlesex County schools, the Ss were mostly girls already in high school; some of them were seniors and many of them had already had considerable foods experience. At best, logistical details were worked out and some measure of teacher and student opinion was obtained from questionnaire responses at these schools. These appear in Appendix P. Raw data for these groups are not appended since no analyses were made on the preliminary studies.

Construction of the Test

Before undertaking to construct a test that could measure the main dependent variable, the investigator

researched the literature, held conferences with other baking teachers and with competent craftsmen in the trade, and reviewed various teacher-made tests. A paper-and-pencil test was ruled out because, while such a test could reveal knowledge about a skill, it could not measure the degree to which the skill could be acquired. Furthermore, the idea of a paper-and-pencil test was totally antithetical to the rationale of this study.

Since three specific loop films were the vehicle for the independent variable, the test had to be based on those films. It was logical, therefore, that a test to measure the acquisition of skill in making the various rolls should be simply to count and evaluate the number of rolls that each student made in a specified time.

Procedure for Administering T_1, T_2, and T_3

Hypothesis 1 states that single concept loop films would facilitate the acquisition of manipulative skills. Such variables as taste, the ability to follow a recipe, or to bake the rolls were not germane to the specific manipulative skill under consideration. Only the degree to which Ss could form "acceptable" rolls was germane. Accordingly, two experts in the trade were called upon to judge appearance; appearance was the sole criterion for acceptability.

At no time were the judges aware of each other's

evaluations, nor were they concerned with which treatment they were evaluating. Reliability of the judges and interjudge compatibility was established in a series of tests described on pages 32-33 and 47-49.

All students were given the opportunity to learn how to make each of the three different types of dinner rolls during a regular 45-minute period. In T_1, the teacher, having first reviewed the film so that his own demonstration would be as nearly like that of the film, presented his lesson in the manner usual for a shop demonstration. He gave each student a baked sample of the roll to be made and asked that it be kept as a model for his or her own work. He then asked for a show of hands as to how many students already knew how to make this roll, as has previously been described. With the students gathered around his bench, the teacher, in the "presentation" step of the lesson, showed and explained how to make the particular roll. He then passed out three pieces of dough to each student for the "application" step and they undertook to imitate making the roll. The teacher then walked around the bench, correcting each student where necessary. This phase of the lesson was timed not to exceed 20 minutes. Students then went to their work stations for a timed practice session (20 minutes) and were given enough dough pieces for 36 rolls. They were reminded that the

rolls made during this practice period were to be theirs to take home. During this period, the teacher gave verbal reinforcement or repeated the demonstration where necessary. The number of individual demonstrations is noted in Table 20. At the end of 20 minutes, students brought their rolls to the oven, then returned to their work stations for the 20-minute performance test.

During the test, the teacher was not to give any physical assistance but was allowed to encourage students with verbal reinforcement such as "That's good" or "They're beautiful" or similar remarks. (This was standard procedure for all treatments.) He was told to act exactly as he would with any group of new students. At the end of 20 minutes, students were told to stop, record their names and the number of rolls made on their "pan tags," and bring their pans to the oven. They were then to clear their work stations, fold their aprons, and go to the cafeteria to await dismissal.

In the case of T_2, the presentation was different only in that the teacher began by first showing the students how to operate the projector. Then he showed the film as Ss stood around his bench. After that, he cut off the projector and gave the same demonstration as he had given to the previous group, assisting and reinforcing where he felt necessary. At the end of the demonstration,

students went to their individual work stations where they could watch the films on their own projectors for as long as they wished during the practice period. They were told, however, that as soon as they felt they knew how to make the roll, "to turn off the projectors so that they would not get too hot and burn out." At the end of the practice period, the projectors were removed. None were in operation during the test period. As in T_1, students brought their practice rolls and their production rolls to the oven and cleared their work stations at the end of the session.

In T_3, no teacher was present. The observer, a graduate student, functioned as a teacher-surrogate. At the beginning of the first day, after being introduced by the guidance counselor, she showed the first film and demonstrated how to operate the projector. She began by holding up a baked sample and said, "If you've ever made this kind of roll before, please raise your hand," as had been done in T_1 and T_2. She then handed out to each of the students a baked sample with the request that it not be eaten but kept as a model. After that, she showed the film to the group for a total of three times. During the showing of the film, she encouraged discussion among the students as to "Why is he doing that?" or "What's he doing now?" but offered no explanation herself.

After viewing the film as a group, students were allowed to go to their work stations where they could run the film by themselves on their own projectors while waiting for the dough to be brought to their work stations.

During the practice period, the observer made four tours of the work stations as she had done in the two previous treatment situations. Timing of the practice and production periods was exactly the same as in T_1 and T_2. Conditions for baking and taking home the practice rolls were also the same. What was different, however, was that the experiment took place between 9:00 and 10:30 a.m., in the cafeteria of their home school. In T_1 and T_2, the experiment took place between 1:00 and 2:30 p.m., immediately after lunch when the Ss arrived at the vocational school (which was not their home school but the school which they were planning to attend). Thus, while the conditions were absolutely the same for T_1 and T_2 (with the exception of the independent variable), it must be stated that though conditions were as nearly alike as possible, they were not identical to those in T_3. What was the same in all three treatments was the amount of bench space per student, the consistency of the dough, complete accessibility to an individual projector, and arrangements whereby each student remained at his work station throughout both the practice and performance test

periods. Diagrams of both shop layouts appear in Appendix Q.

Data Collection of the Dependent Measures

Data on the following three measures were collected by a trained observer and two judges during each treatment session:

Acceptable units produced. Each student was given a "pan tag" on which he wrote his station number and the number of units produced. Each judge independently evaluated each response as to whether it was "acceptable" according to previously established criteria. Scores were recorded on standardized forms. Raw data for each treatment group were recorded on a single sheet (Appendix D), from which IBM cards were compiled. After coding, analysis of variance was performed based on the number of acceptable units by task, treatment, sex, and shop choice.

Student conversation. The observer made four 5-minute "tours" of the shop during both the practice and test periods, pausing at each work station long enough to record observations relative to the following: negative or positive student remarks, non-task or task-related conversation, and whether or not the students seemed to enjoy the work. Although the data relative to these variables are highly subjective, they are

presumed to correlate with teaching-learning climate.

Student dependence. In addition to the above, the observer noted how long the projectors were on and how many times the teacher gave physical assistance. It was inferred that the more times the teacher found it necessary to give personal assistance, the greater the degree of student dependence on the teacher.

Analysis of the Data

The data were analyzed from two viewpoints: (1) objective data relative to the main dependent variable, i.e., the actual physical count of responses to roll-making tasks; and (2) subjective data based on student behavior from which inferences might be drawn as to the "positiveness" of the various levels of the independent variable, i.e., the teaching methods. Forty-two Ss comprised the three groups: 15 in the control group; 12 and 15, respectively, in the two experimental groups. Subgroups were established on the basis of shop choice and sex. There were 22 black and 20 white students, almost equally distributed within all groups. Analysis of variance, factorial design, with unequal number of observations in subgroups was used to determine whether significant differences existed among the groups taught by the different methods. Only one teacher was involved for groups T_1 and T_2; T_3 was supervised by the observer.

With regard to the procedures to be performed with the subjective observations (as differentiated from the objective observations and the acceptability scores on the performance tests), one of the problems was that the design of the experiment did not provide for a clear-cut error term. As a result, it was necessary to make certain assumptions as to which terms should be pooled in order to derive an error term so that levels of significance of the various effects could be compared. Thus, only those terms were pooled which had error terms of the same order of magnitude, and, as a result, were assumed to be estimates of the same error.

In addition to the analysis of variance, an additional procedure within the analysis of variance--the analysis of unweighted means--was also used. This was necessary because the sample sizes for each treatment combination were not the same. In view of the relatively limited sample size, it was not considered expedient to throw data away to balance up the samples. The use of the analysis of unweighted means, although somewhat of an approximation, is standard statistical procedure.

The first step in this procedure is to do an analysis of variance of the means of each treatment combination: as an additional step, the standard error of the mean was computed to test significance.

CHAPTER IV

RESULTS*

Introduction

A comparison of treatment groups is presented in Table 1.

Since there were a number of students in one of the treatment groups with IQ's over 100, it was necessary to determine if there was a relationship between IQ and the effectiveness of SSCLF for facilitating the acquisition of manipulative occupational skills, as measured by the number of acceptable units produced in a performance test. A linear regression was run treating IQ as the independent variable and number of units as the dependent variable. The results of the analysis failed to indicate that a relationship existed. However, valid prediction is not possible because there were too few points on which to plot meaningful lines for linear and quadratic equations. Thus, Table 2 only suggests the absence of a relationship.

To test the five hypotheses, analysis of variance,

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*The raw data from which values were computed may be found in Appendix D.

TABLE 1

COMPARISON OF TREATMENT GROUPS

	N	Mean age	Mean IQ	Mean reading level	Grade	Sex	Choice	Race
						%		%
Teacher Only (T_1)	15	15.4	74.1	4.09	9	53.3 M	Foods	53.0 B
						46.6 F	Non-foods	47.0 W
Teacher + Film (T_2)	12	15.2	76.6	4.76	9	41.7 M	Foods	58.0 B
						58.3 F	Non-foods	42.0 W
Film Only (T_3)	15	14.5	99.8**	5.6*	8	46.6 M	Food	60.0 B
						53.3 F	Non-foods	40.0 W

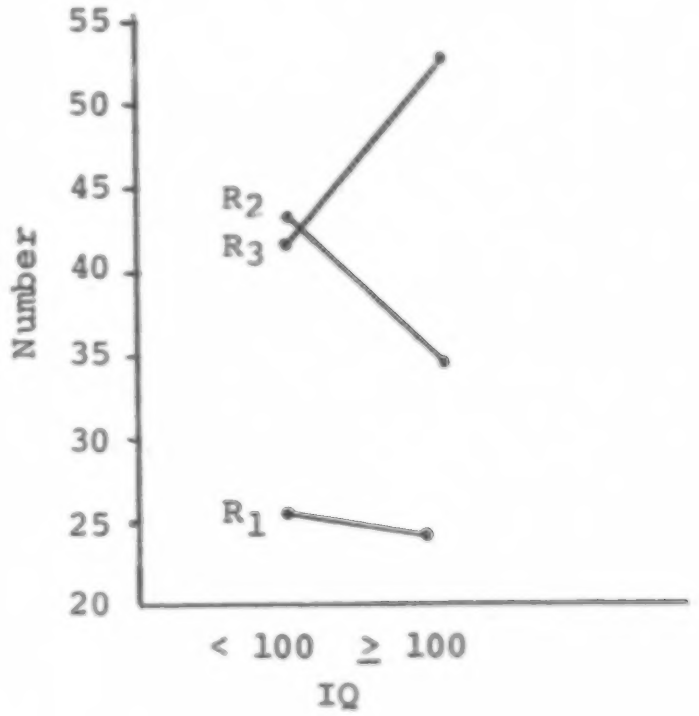
*Significant at .05.

**Significant at .01.

TABLE 2

TABLE OF MEANS FOR IQ AND STUDENT PRODUCTION

Task	IQ	
	< 100	≥ 100
Buttons	26.3	24.05
Twists	43.7	34.4
Rounds	42.0	53.3



No significant differences.

factorial design was used. Because sample sizes were not the same, analysis of unweighted means was also necessary (Anderson & Bancroft, 1952).

Table 3 reflects the reliability of judges. Inter-judge compatibility may be inferred from the same data. However, the overall analysis was complicated somewhat due to the fact that one of the judges was missing one day (judge #2 was missing for R_3 and T_1). It was necessary, therefore, to consider the data in two different ways: (1) in one situation, the first treatment was removed; and (2) in the other situation, the third task was removed.

In all, 18 treatment combinations were involved in the analyses relative to the number of rolls produced, and an error term of 82.81 was derived.

Reliability of Judges and Interjudge Compatibility

The procedure was the same for both sets of judges. Judge #1 was a constant throughout the experiment. It is evident from Tables 3 and 4 that each judge was consistent in his judging and that there were no significant differences between their judgments. The requirements for judge reliability and interjudge compatibility were satisfied. The test devised to measure these variables was described in Chapter III.

TABLE 3

RELIABILITY AND INTERJUDGE COMPATIBILITY FOR T_1

	Buttons	Twists	Round
Judge #1 (Executive Secretary)	32/33*	29/33	32/32
	33/33	30/33	31/32
	31/33	28/33	31/32
Judge #2 (Chef)	31/33	32/33	31/32
	31/33	31/33	31/32
	30/33	32/33	32/32

*Denominator = Number of trials.
Numerator = Number of correct choices.

TABLE 4

RELIABILITY AND INTERJUDGE COMPATIBILITY FOR T_2 AND T_3

	Buttons	Twists	Round
Judge #1 (Executive Secretary)	33/33*	28/33	32/32
	31/33	28/33	32/32
	31/33	29/33	31/32
Judge #3 (Alternate)	30/33	31/33	32/32
	32/33	33/33	32/32
	29/33	32/33	31/32

*Denominator = Number of trials.
Numerator = Number of correct choices.

Hypothesis 1

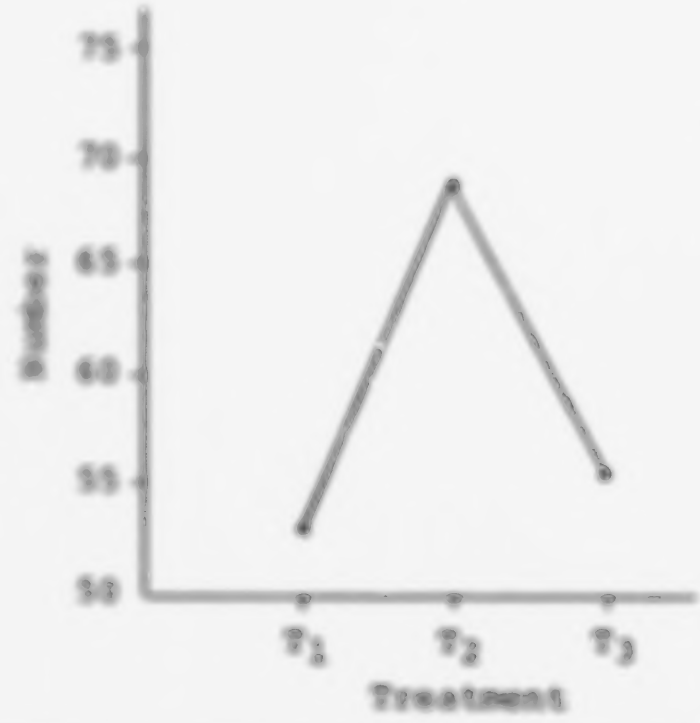
There is no significant difference in the amount of manipulative skill acquired by students taught by the three methods, as measured by performance tests.

The analysis for each of the hypotheses was analysis of variance, factorial design. The computer program was BMD12V and may be found in Appendix B. For H_1, the dependent variable was the actual number of units produced during a timed performance test. Three separate tasks were involved, one for each day of the study. It can be seen from the data that there was a significant difference between Task 3 (making round rolls) and the other two tasks. This was due to the fact that round rolls are made two at a time whereas twists and buttons are made one at a time. Inasmuch as the three tasks were the same for all groups, the significance of the difference between tasks was not considered relevant. What is relevant and graphically shown in Table 5 is that when the teacher's demonstration was supplemented by films, students produced significantly more units than in either of the other two treatments. It is also relevant that students in the Films Only treatment produced about the same number of units as students in the Teacher Only treatment. The hypothesis that there is no significant difference in the amount of occupational manipulative skill acquired by students taught by three different methods as measured

TABLE 5

TABLE OF MEANS FOR THREE LEVELS OF THE DEPENDENT VARIABLE

Treatment*	Number of rolls
Teacher Only (T_1)	53.1
Teacher + Film (T_2)	65.9
Film Only (T_3)	55.8



*Significant at .05.

by the number of acceptable units produced on performance tests was rejected.

Hypothesis 3

There is no significant difference in the degree to which shop climate becomes more conducive to the acquisition of skill through the presence of SSCLF, as measured by student conversation during performance.

It was an assumption of this study that shop climate is more conducive to the acquisition of manipulative skill when student conversation is positive rather than negative, when conversation is task-related rather than non-task-related, when students talk less, and when students enjoy what they do.

Observations in relation to "positive comments."

No significant differences were found between the groups with regard to treatment. Nor was there any difference between the practice and performance test period. But there was a difference significant at the .01 level with regard to tasks--all groups made more positive comments during the first (and simplest) task than during either of the other tasks as shown in Table 6.

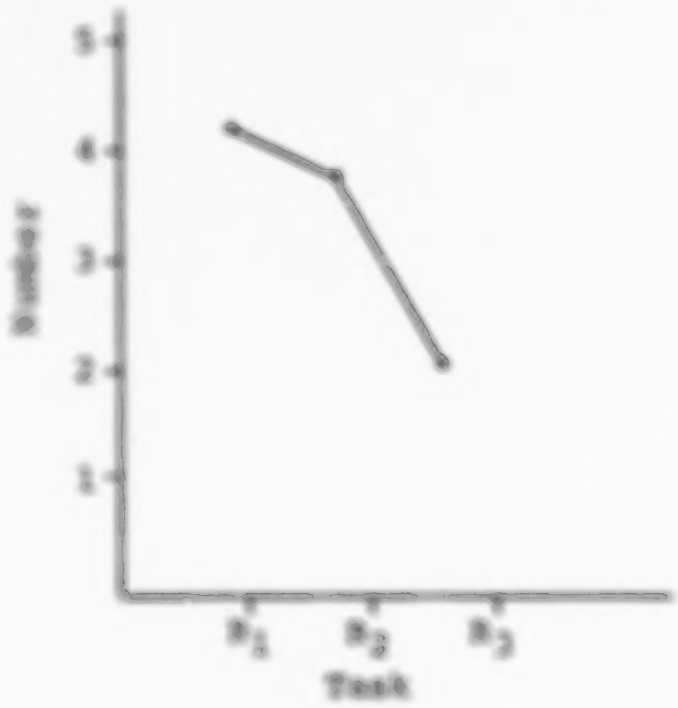
Observations in relation to "negative comments."

Here, too, no significant difference was noted in treatment during either the practice or performance test periods. There was some task effect, but it was not found to be significant. Students seemed to complain a little

TABLE 6

TABLE OF MEANS FOR NUMBER OF POSITIVE COMMENTS
DURING THE THREE TASKS

Task	Positive comments*
Making Buttons (B_1)	4.2
Making Twists (B_2)	3.8
Making Rounds (B_3)	2.0



*Significant at .01.

more about making round rolls than making twists or buttons. The grand mean for negative comments was 3.57 compared with 4.39 for positive comments.

Observations in relation to "seems to enjoy task." The data for this variable were investigated along a continuum: "seems to enjoy," "doubtful," "seems to dislike." While there was considerable difference between students, very little difference between treatment groups was noted. Regardless of the method, more students seemed to like what they were doing than seemed not to like it, as noted by the trained observer and student responses on questionnaires (Appendix F).

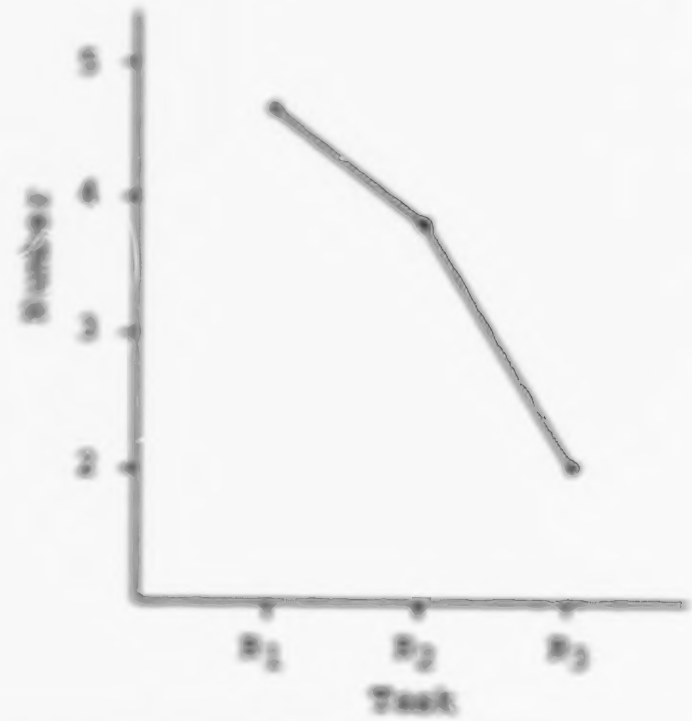
Observations in relation to "task-related conversation." Variables germane to task-related conversation were analyzed at a number of levels. Treatment-by-tasks and treatment-by-sex were found to be significant. The latter are reported under Hypothesis 3. It can be seen from Tables 7 and 8 that there was considerably more task-related conversation during the first task than during the last. Also, that students talked more about what they were doing in the Teacher Only treatment than in either of the other two treatments.

Observations in relation to "non-task conversation." The grand mean for non-task conversation was 7.38 compared with a grand mean of 3.27 for task-related

TABLE 7

TABLE OF MEANS FOR TASK-RELATED COMPREHENSION FOR THE THREE TASKS

Task	Task-related responses*
Making Buttons (R_1)	4.7
Making Twists (R_2)	3.8
Making Rounds (R_3)	2.8

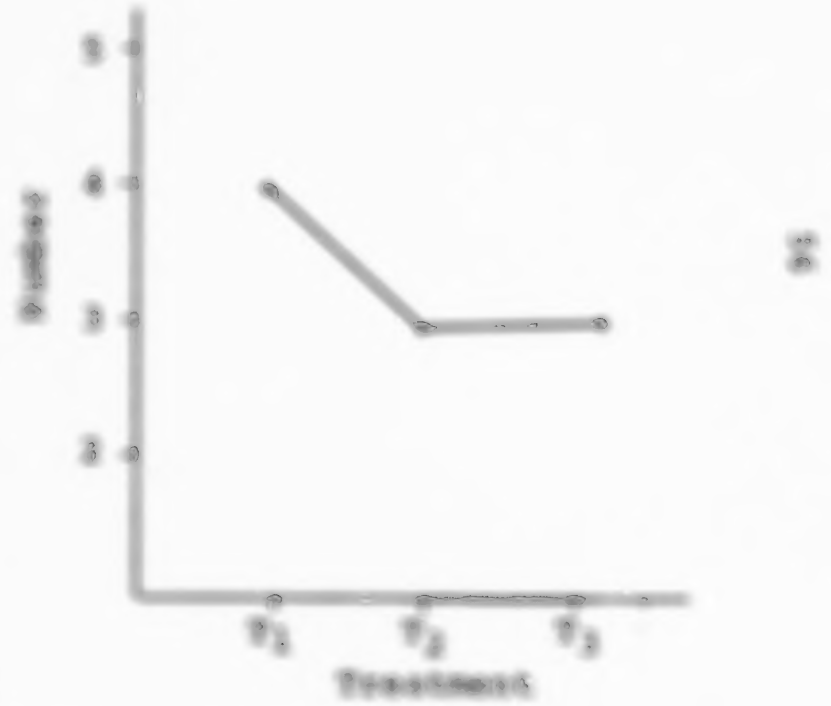


*Significant at .01.

TABLE 8

TABLE OF RECORD FILE TASK-RELATED (INFORMATION)
FILE TEST TRIALS TREATMENTS

Treatment	Task-related responses
Teacher Only (T_1)	6.0
Teacher + Film (T_2)	2.0
Film Only (T_3)	2.0



No significant difference.

conversation. But there were significantly fewer non-task responses during the Film Only treatment than during the Teacher Only treatment as can be seen from Table 9.

For the three tasks, there was no significant difference in the amount of non-task related conversation. However, for the three treatments, there was a significant interaction between tasks and treatments.

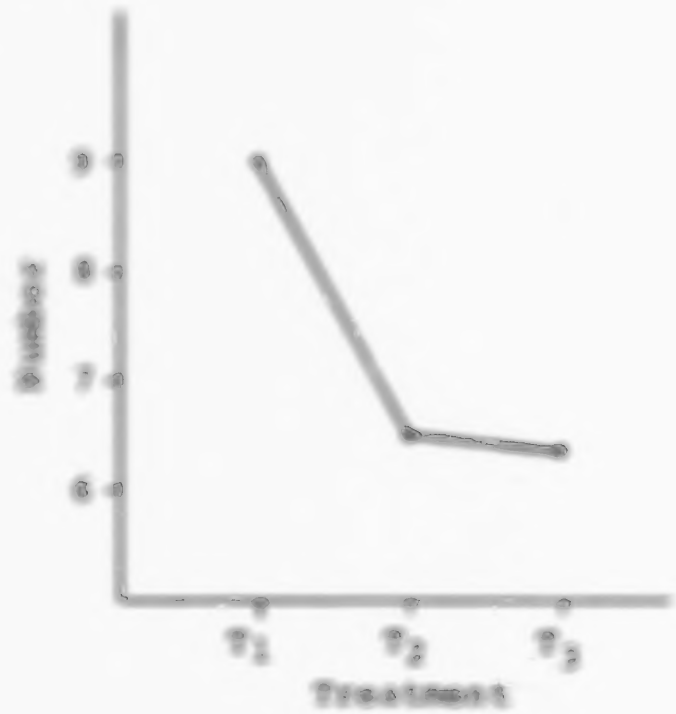
Regardless of the task, there was much the same amount of non-task conversation when only the teacher was present. When SIMILE was adjunctive to the teacher, non-task conversation dropped off. But when there was no teacher, the amount of non-task conversation varied significantly with the task, and fell off most when the task was most difficult.

In summary, the teaching-learning climate in T_3 tended to be most conducive to the acquisition of skill when measured by student conversation. When the number of positive remarks were compared with the number of negative remarks, Ge in T_3 tended to be least dissatisfied. However, when measured by the kind of conversation in which Ge engaged, Ge in T_3 seemed to be most interested and to enjoy the tasks more than Ge in either T_1 or T_2. The hypothesis that there is no significant difference in the degree to which the step climate is more conducive to the acquisition of occupational skill when SIMILE climate

TABLE 9

TABLE OF MEANS FOR NON-CAGE CONFIGURATION

Treatment*	Non-task responses
Teacher Only (T_1)	9.0
Teacher + Film (T_2)	6.5
Film Only (T_3)	6.4



*Significant at .01.

is compared with traditional shop climate, as measured by student conversation, was rejected.

Hypothesis 3

There is no significant difference in the effectiveness of SSCLF for boys or for girls, as measured by performance tests.

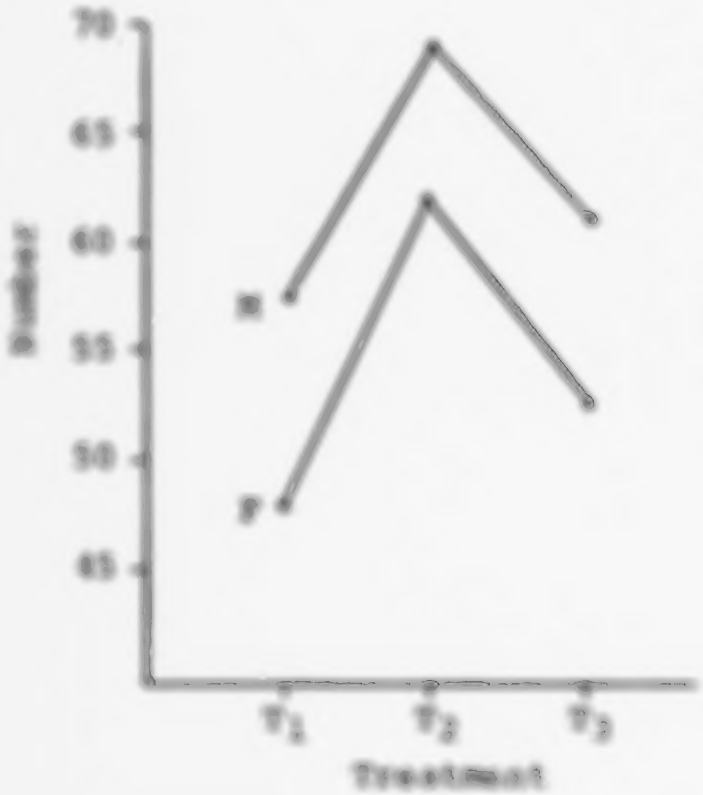
While there was no significant treatment-by-sex interaction, boys consistently produced more rolls than girls within treatments as can be seen from Table 10. It is also clear from the graph that both sexes responded in the same way to the three treatments and the three tasks. Only in a three-way analysis of treatment-by-task-by-sex were significant differences noted. Here, a Tukey's test yielded an index of 21.99 and differences greater than that were considered significant. These are shown in Table 11.

It can be seen in Tables 12 and 12A that the treatment-by-task effect did not remain the same for the males as for the females. In the first task, females were consistent as to their success with the various treatments, but males were significantly different between treatments. Their production was almost double for R_2 as compared with R_1. There is reason to believe that a greater first-day effect was taking place for boys than for girls, for, after the first day, there was greater consistency between male and female production.

TABLE 10

TABLE OF MEANS FOR TREATMENT-BY-SEX INTERACTION

Treatment	Number of acceptable responses for both sexes	
	Females	Males
T_1	48.4	57.7
T_2	62.6	69.1
T_3	50.3	61.4

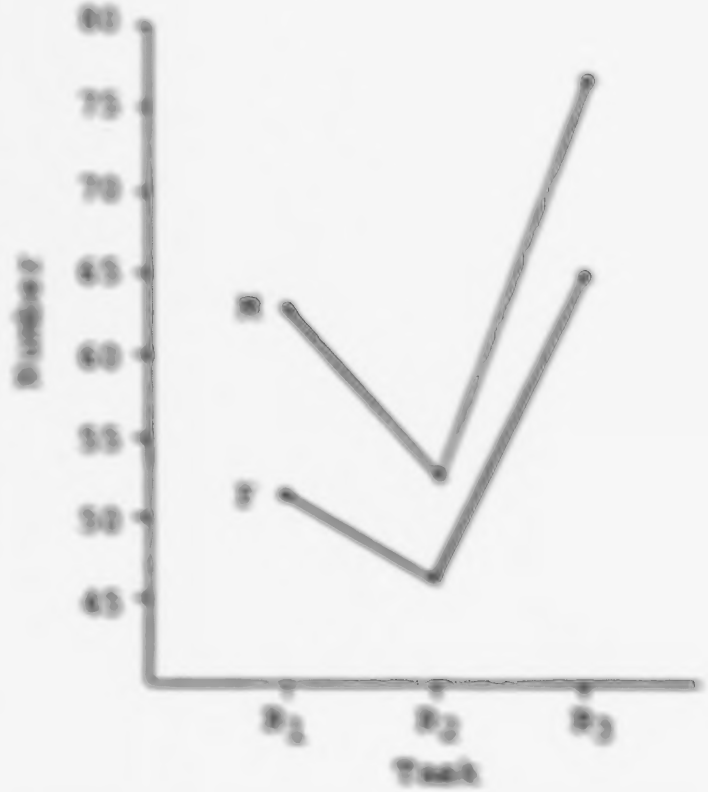


No significant difference between sexes.
No significant treatment-by-sex interaction.

TABLE 11

TABLE OF MEANS FOR SEX-BY-TASK INTERACTION

Task	Number of acceptable responses for both sexes	
	Females	Males
Buttons (R_1)	50.3	58.0
Twists (R_2)	46.0	63.7
Round (R_3)	65.0	77.5

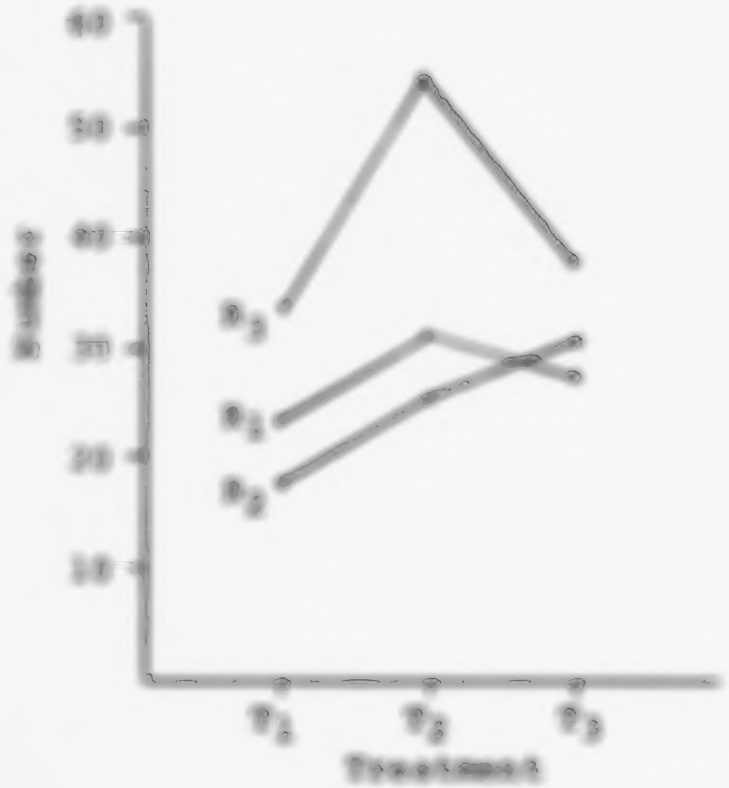


No significant difference between sexes.
No significant treatment-by-sex interaction.

TABLE 12

THREE-WAY TABLE OF MEANS FOR TREATMENT-BY-TASK-BY-SEX (FEMALES)

	Females*		
	Number of acceptable units		
Task	Teacher Only (T_1)	Teacher + Film (T_2)	Film Only (T_3)
Buttons (B_1)	24	30.2	27.6
Twists (B_2)	18	26.6	30.5
Round (B_3)	37	52.8	29.3

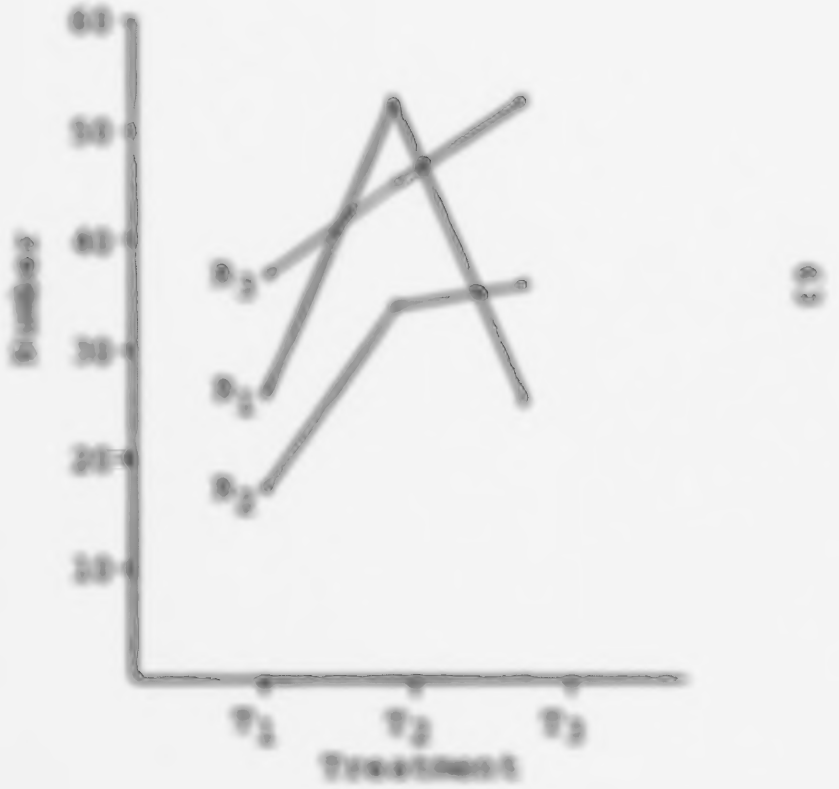


*Interaction significant at .01.

TABLE 13A

THREE-WAY TABLE OF MEANS FOR TREATMENT-BY-TASK-BY-SEX (Males)

	Males*		
	Number of acceptable units		
Task	Teacher Only (T_1)	Teacher + Film (T_2)	Film Only (T_3)
Buttons (B_1)	25.9	33.4	25.3
Twists (B_2)	18.2	32.6	36.0
Round (B_3)	37.0	45.0	52.2



*Interaction significant at .01.

In summary, the data fail to produce evidence that SSCLF affects the acquisition of skills differently for boys than for girls. While the quantity of acceptable rolls produced by males exceeded the quantity produced by females at the .05 level regardless of the treatment, both sexes responded similarly to the intervention and both produced a greater number of acceptable units with SSCLF. The data failed to reject the hypothesis that there is no significant difference in the effectiveness of SSCLF for facilitating the acquisition of occupational skills by boys or girls. In other words, SSCLF was effective for both sexes, despite any prior difference in ability between the sexes.

Hypothesis 4

There is no significant difference in the degree to which SSCLF facilitates the acquisition of skill in a specific occupational area for students who have made an occupational choice in that area and students who have not, as measured by a performance test.

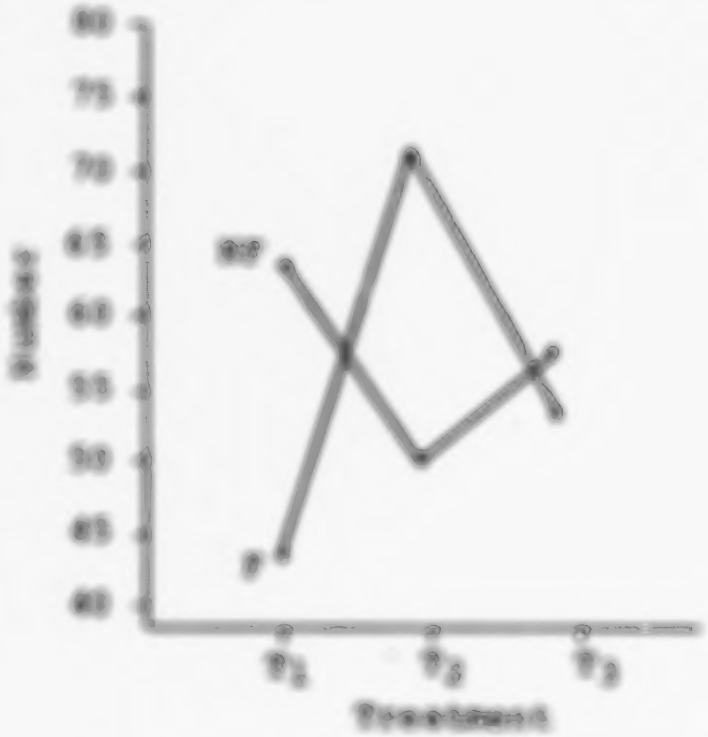
A significant treatment-by-choice interaction was noted, i.e., there was a failure of the differences between the treatments to be the same for foods students and non-foods students, at the .01 level, as indicated by Table 13.

Non-foods students did significantly better than foods students in T_1, but foods students did significantly better than non-foods students in T_2. Non-foods students

TABLE 13

TWO-WAY TABLE OF MEANS FOR TREATMENT-BY-SHOP CHOICE

Treatment	Responses according to shop choice*	
	Foods	Non-foods
Teacher Only (T_2)	63.3	66.0*
Teacher + Film (T_1)	71.3	69.6**
Film Only (T_3)	53.3	57.8



*T_2 significant at .05.

**T_1 significant at .01.

T_3 no significant difference.

did not show significant differences between the three treatments but performed best in the *Teacher Only* situation. Female students performed best with *Teacher + Film*. Throughout, both groups responded differently, not only to the treatments but to the tasks as well, as can be seen in Table 13. The hypothesis that there is no significant difference in the degree to which *SOCLE* facilitates the acquisition of skill in a specific occupational area for students who have made an occupational choice in that area and students who have not, as measured by a performance test, was rejected.

Hypothesis 5

There is no significant difference in the amount of individual assistance a teacher finds it necessary to provide, whether *SOCLE* is available or not.

The probability was investigated that the more students use the projectors, the less they will need to depend on the teacher. The number of times the teacher gave personal assistance to individual students was counted. For total number of minutes that projectors were on, and teacher assists, see Tables 17 and 20.

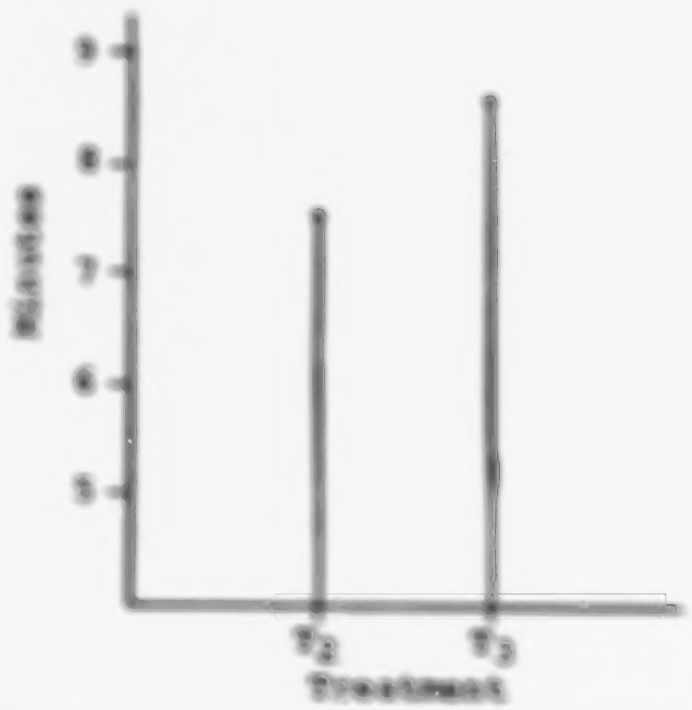
Tables 16 and 19 show that there were differences significant at the .01 level as to the use of the projectors along dimensions of treatment, task, and time.

When g_2 had a teacher (T_2), there was less need to use the projector; when film was the only resource, it

TABLE 14

TABLE OF MEANS FOR SUBJECTS' USE OF PROJECTOR FOR T_2 AND T_3 IN TERMS OF NUMBER OF MINUTES PER STUDENT

Treatment*	Minutes
Teacher + Film (T_2)	7.3
Film Only (T_3)	8.6



*Significant at .01.

was used more. It was to be expected that there would be fewer projectors on at the end of the 20-minute level than at the 5-minute level, but the reason why only 8.68 projectors were on at the beginning needs to be explained. Only the last 20 minutes of the first period had been set aside for the timed practice session; prior to this, students may have been watching as a group or at their individual stations, and when the timed practice session actually began, some students felt they had already mastered the skill. Thus, Table 16 does not show all of the projectors in use, as might normally be expected in a new learning situation. Table 15 shows total task use.

In Table 16 the data would seem to suggest that students had less need to use the film for B_2 (making round rolls) than for the other two tasks. The table fails to reflect certain variables that could not be controlled yet might account for the significant task-by-time difference. For example, the skill itself (making round rolls) was somewhat different from the previous two skills as has previously been explained. Also, the skill of making round rolls was demonstrated in the film eight times as compared with only once for making buttons and three times for making twists. And might it not be logical to suppose that by the third day students were learning better how to learn from films and simply did not

need to watch them as long? Any or all of these factors could have been operating.

In summary, it would seem that the more the students availed themselves of the use of the projectors, the less they had to call on the teacher for personal assistance. As measured by students' responses to the questionnaire as to whether they felt they had received sufficient personal attention (Appendix F), there was no significant difference on the satisfaction variable. The data show that within the context of the stated variables even an experienced teacher may be significantly more effective with the use of SMILE, and the hypothesis that there is no significant difference in the amount of individual assistance a teacher finds it necessary to provide, whether SMILE is available or not, was rejected.

Discussion

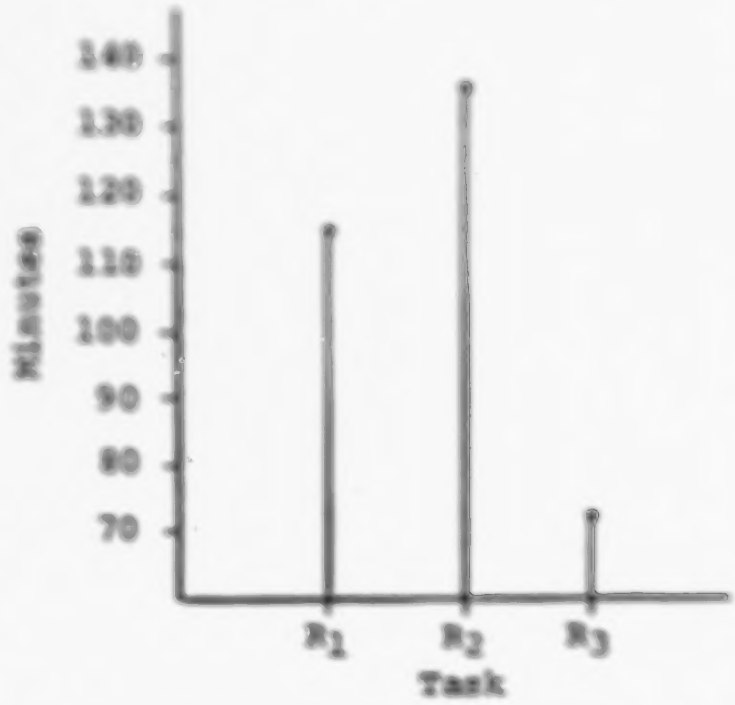
In the preceding sections, the investigator has discussed: (1) comparability of Ps and schools, reliability, and interjudge compatibility; (2) subjective and objective data bearing on the dependent variables; and (3) some important factors influencing the acquisition of skills.

Because there is evidence that, for youngsters from disadvantaged backgrounds, IQ and reading levels are not the <u>sine qua non</u> of intelligence (Bloom, 1964), it was

TABLE 13

TABLE OF MEANS FOR SUBJECTS' USE OF PROJECTOR FOR THREE TASKS

Task*	Minutes
Making Buttons (R_1)	112.5
Making Twists (R_2)	132.5
Making Rounds (R_3)	72.5

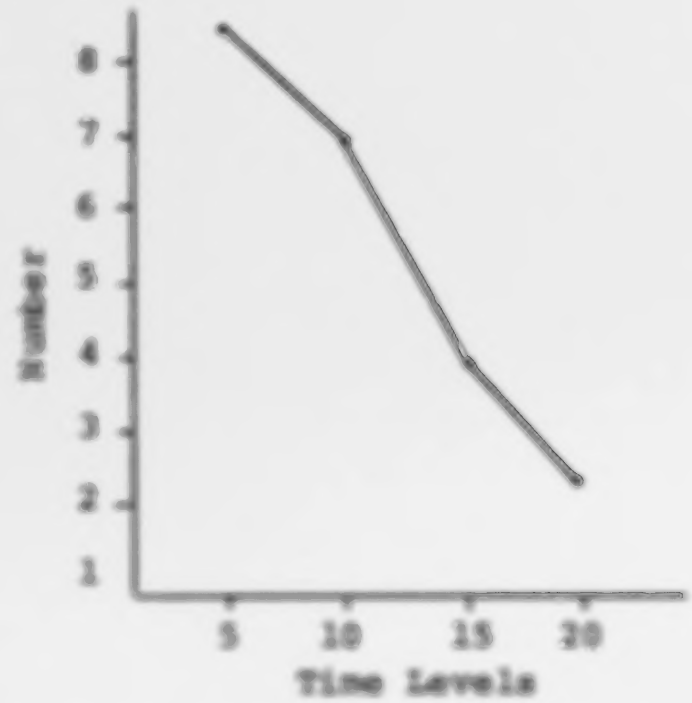


*Significant at .01.

TABLE 16

TABLE OF MEANS FOR NUMBER OF PROJECTORS ON AT TIME CHECK LEVELS

Levels	Projectors on*
5 minutes	8.67
10 minutes	7.00
15 minutes	4.00
20 minutes	2.17

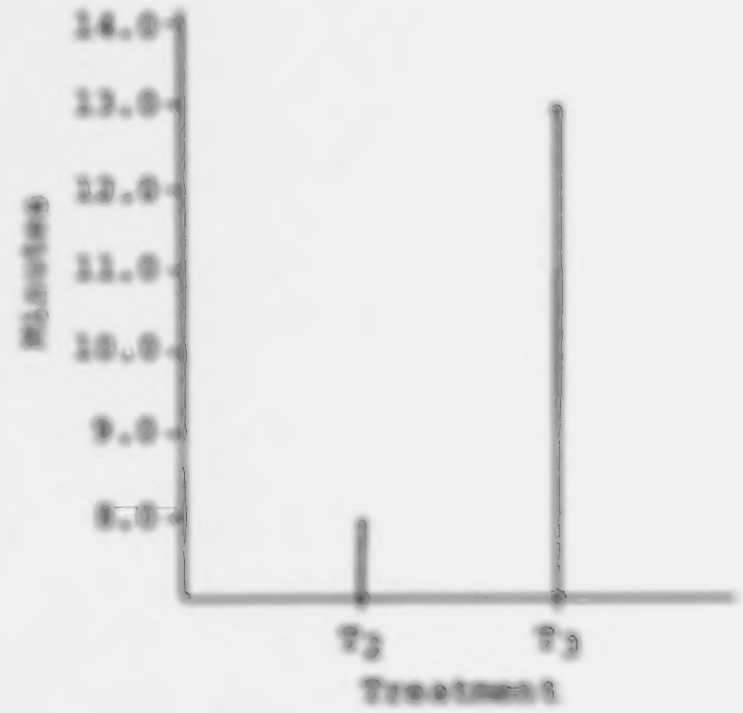


*Significant at .01.

TABLE 17

TABLE OF MEANS FOR TREATMENT-BY-TIME EFFECT

Treatment	Number of projectors in use at end of: 5 min.	10 min.	15 min.	20 min.	Projector minutes* per student
T_2	7.33	6.00	3.00	1.33	8.0
T_3**	10.00	8.00	5.00	3.00	13.0



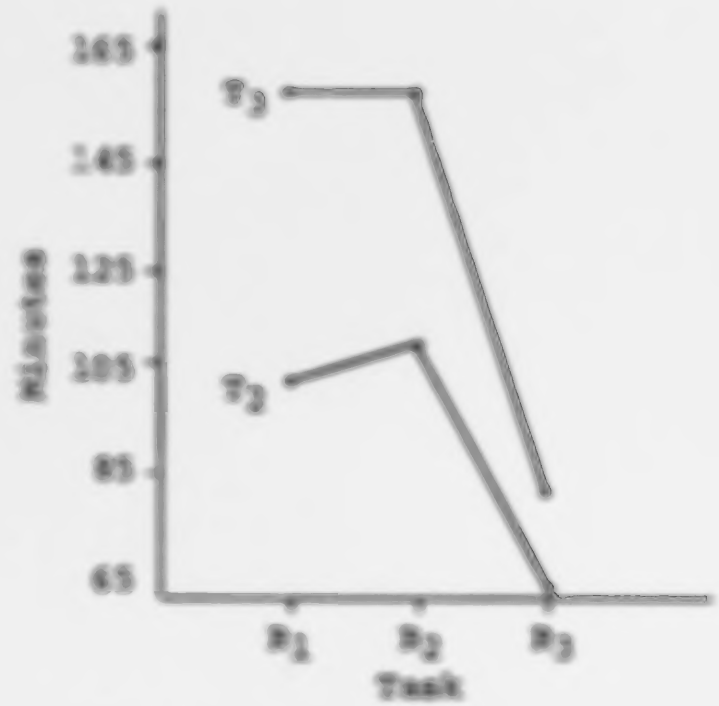
*There was room for only 11 projectors in T_2 compared with 13 in T_3. Projector minutes takes this into account.

**Significant at .01.

TABLE 18

TWO-WAY TABLE OF MEANS FOR TREATMENT-BY-TASK EFFECT

Task	Number of projectors in use at end of: 5 min.	10 min.	15 min.	20 min.	Equated projector minutes
			Teacher + Film		
R_1	8.0	8.0	2.0	0.0	100
R_2	8.0	6.0	4.0	4.0	110
R_3	6.0	4.0	3.0	0.0	65
			Films Only		
R_1	11.0	11.0	6.0	3.0	155
R_2	11.0	11.0	8.0	6.0	155
R_3	8.0	5.0	3.0	0.0	80

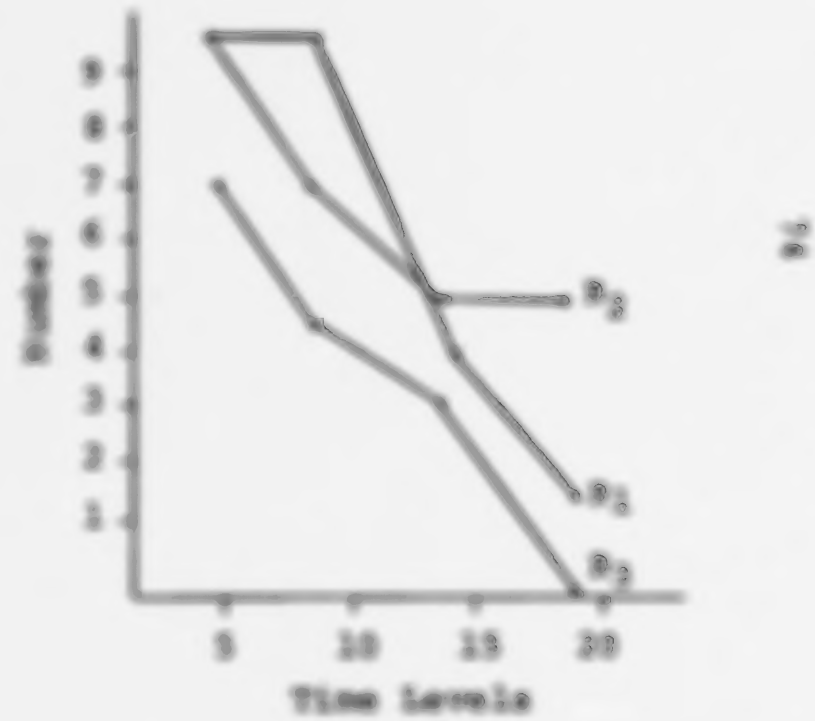


No significant treatment-by-task effect.

TABLE 19

TWO-WAY TABLE OF MEANS FOR TIME-BY-TASK EFFECT

Task	Number of projectors on at end of: 5 min.	10 min.	15 min.	20 min.
Decision (B_1)	9.5	9.5	4.0	1.5
Twists (B_2)	9.5	7.0	5.0	5.0
Sound (B_3)	7.0	4.5	3.0	0.0

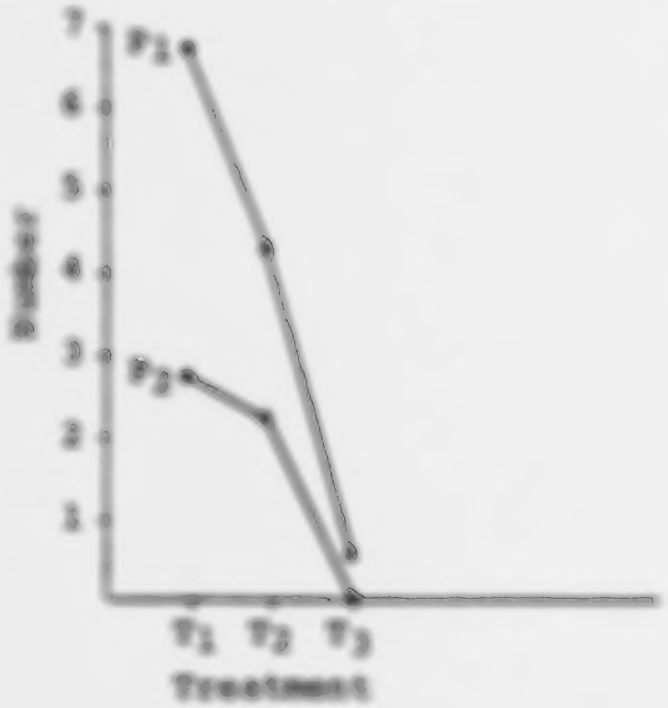


No significant time-by-task effect.

TABLE 20

TWO-WAY TABLE OF MEANS FOR NUMBER OF TIMES TEACHER ASSISTS STUDENTS

Treatment*	Assists during practice	Assists during performance test
Teacher Only (T_1)	6.66	2.83
Teacher + Film (T_2)	4.16	2.33
Film Only (T_3)	0.5	0.0



*Significant at .01.

P_1 = practice.

P_2 = performance test.

not felt that IQ differences for the ss of this study affected comparability. This was supported in a polynomial regression in which no significant difference was found on the performance test scores of those few students ($n = 7$; $\bar{X} = 107.4$) whose IQ's exceeded 100, with those whose scores were below 100.

Judges were found to be highly consistent in their judging and compatible with each other. As for schools, there was no question as to the comparability of the schools from which the experimental group, Teacher + Film (T_2), and the control group, Teacher Only (T_1), were drawn inasmuch as these were drawn from the same four predominantly black inner-city junior high schools. However, it cannot be said that these schools were comparable with the school from which the other experimental group, Film Only (T_3), was drawn since the latter was a rural-suburban school with a smaller black student population. Findings that depend on comparison with the Film Only (T_3) treatment group, therefore, cannot be regarded as conclusive. But the findings that relate to the effect of SSCLP with the two fully comparable groups from comparable schools, taught and tested in the same school by the same teacher, warrant careful consideration.

Two classes of data bearing on the dependent variables were reported: subjective data based on the

Observer's Data Sheet, and objective data based on the performance test scores.

The data derived from the Observer's Data Sheet tend to support the belief that shop climate was improved by the intervention of SSCLP. However, such data are extremely difficult to assemble and interpret. For one thing, at any given time, when a particular student was being observed, there were 14 students who were not being observed. For another, the observer noticed that as she approached the work stations closely enough to hear students' conversation, conversation often stopped. At best, observations merely hint at directions for future investigation.

The objective data relative to students' scores on performance tests were more conclusive. The experienced shop teacher was significantly more effective when his demonstration was supplemented by SSCLP. Not only did students more successfully acquire the occupational skills in the experiment but they were less dependent on the teacher. The opinions of teachers in whose shops the preliminary study and the final experiment were carried out are contained in their personal reports which appear in Appendix F.

CHAPTER V

SUMMARY

The Problem

The study was designed to answer the question: Can the use of silent single concept loop films (SSCLF) facilitate the acquisition of manipulative occupational skills for nonacademic students?

Specifically, the problem involved an experiment using three different treatments for teaching a number of basing skills to three sample groups of vocational school bound nonacademic students. The three treatments were: (1) traditional teacher demonstration, (2) teacher demonstration plus silent single concept loop films, and (3) silent single concept loop films only with no teacher.

The effect of the intervention was evaluated along two dimensions: (1) student performance as measured by the actual number of acceptable units produced within a given time, and (2) the degree to which the shop climate became more (or less) conducive to the acquisition of skill when SSCLF was available as measured by student conversation.

Hypotheses

A number of questions were raised in examining the effects of the three treatments:

1. Can a teaching technique in which the teachers' demonstration is supplemented by the students' individual use of SOCLAP facilitate the acquisition of manipulative occupational skills?

2. To what extent can SOCLAP alone achieve the same results?

3. Does a student's occupational choice affect the degree to which he will succeed in learning by the SOCLAP method?

4. Is there a difference in the effectiveness of SOCLAP method for boys and for girls?

These questions led to the formulation of the following five null hypotheses which are concerned specifically with the population of students who were exposed to the three treatments:

Hypothesis 1. There is no significant difference in the amount of manipulative skill acquired by students taught by the three methods, as measured by performance tests.

Hypothesis 2. There is no significant difference in the degree to which shop climate becomes more conducive to the acquisition of skill through the presence of SOCLAP.

as measured by student concentration during performance.

Hypothesis 3. There is no significant difference in the effectiveness of DECAF for boys as for girls, as measured by performance tests.

Hypothesis 4. There is no significant difference in the degree to which DECAF facilitates the acquisition of skill in a specific occupational area for students who have made an occupational choice in that area and students who have not, as measured by a performance test.

Hypothesis 5. There is no significant difference in the amount of individual assistance a teacher finds it necessary to provide, whether DECAF is available or not.

Assumptions

The following assumptions were basic to this investigation:

1. The factors which govern the acquisition of skills with DECAF at an individual work station, while related somewhat to the factors that govern group learning with conventional sound motion pictures, are not the same.

2. The acquisition of manipulative occupational skills can be measured by a performance test and qualified experts in a trade can make valid judgments about a student's performance even though such judgments may be largely subjective.

3. While it is not possible to overhear and record everything a student says, a trained observer can record a sufficient number of remarks on which a valid judgment as to the teaching-learning climate may be inferred.

Limitations

1. The results of the study are limited by the validity and reliability of the researcher-designed measuring instruments.

2. The design did not provide for replication within the treatments.

3. Although the experimental sites were identical for T_1 and T_2, these were only similar but not identical to T_3.

4. Although all three tasks were comparable between treatments, the nature of R_3 was such that responses to it were not entirely comparable to the responses to R_1 and R_2.

5. Comparisons between the treatment groups in the preliminary studies and those in the experiment were limited by the fact that some variables could not be controlled.

6. Triple interactions between variables could not be accurately weighted or fully explained.

7. Although Hawthorne and novelty effects were equalized throughout all three groups, the effect of

novelty may not have been the same for all students.

Procedure

The study was conducted during the Spring term of 1970 to determine the effectiveness of silent single concept loop films to facilitate the acquisition of manipulative occupational skills for nonacademic students. Three treatments were involved: Teacher Only, Teacher + Film, and Film Only. The subjects (N = 42) consisted of three equivalent groups of junior high students, most of whom were planning to enter vocational school the following term. The first two groups were drawn from the same four sending schools and were randomly assigned to either the Teacher Only or the Teacher + Film treatment. The same teacher was involved for both of these treatments. The third group was drawn from the population of vocational school bound students within a single junior high school and assigned to the Film Only treatment. Each group was exposed to learning a new baking task each day for three consecutive days. Responses relative to the main dependent variable were evaluated and recorded by two experts. Additional responses relative to student behavior were recorded by a trained observer.

Each daily session consisted of two consecutive periods. Within the first period, the last 20 minutes were set aside for evaluated practice; within the second

period, the first 20 minutes were set aside for the performance test. The response measured was "acceptable" rolls. Students were permitted to take home the rolls they made during the practice period. Rolls made during the performance test period were for use in the school lunch program.

The experimental team consisted of:

The investigator whose function was solely logistical.

A graduate student who was trained during a three-day preliminary study to function as the observer. During the Films Only (T_3) treatment, she also functioned as "teacher-surrogate."

Two judges. One was the Executive Secretary of the New Jersey Bakers Board of Trade who was a constant throughout the experiment. For T_1, the second judge was a professional chef; for T_2 and T_3, the second judge was a professional baker.

A baker whose function was to mix the dough and later bake the rolls.

The Commercial Foods shop teacher who taught both the T_1 and T_2 groups.

A janitorial assistant.

The data were analyzed using analysis of variance for factorial design. Analysis of unweighted means was

also used where the sample sizes for each treatment combination were not the same. A Tukey's test was used to determine where differences between means lay when an F test indicated that such differences did indeed exist.

Findings

1. Differences significant at the .05 level of confidence were found in the amount of occupational skill acquired as measured by the number of acceptable units produced under controlled conditions. Students in the Teacher + Films group acquired significantly more skill than either the Teacher Only or Films Only group. These data are presented in Table 5, page 51.

2. There was no significant difference in the degree to which the shop climate was more conducive to the acquisition of skill under any of the three treatments as measured by student conversation. However, when SSCLF supplemented teacher demonstration, students were more inclined toward task-related conversation. When only SSCLF was available and a shop teacher was not present, Ss talked least. These data are presented in Tables 7, 8, and 9, pages 53, 54, and 58.

3. There was no significant difference in the effectiveness of SSCLF method for boys or for girls. These data are presented in Tables 10-12A, pages 60-63.

4. As measured by quantitative performance tests,

significant differences were noted only in the Teacher + Film treatment in the amount of occupational skills acquired by students who have chosen (but not yet entered) a specific occupation and students who have not so chosen. These data are presented in Table 13, page 65.

5. There was a difference, significant at the .01 level, in the number of repeated individual demonstrations required of the teacher when his instruction was supplemented by SSCLF and when it was not. These data are presented in Table 20, page 75.

Conclusions

1. Teacher + Films (T_2) is more effective than either Teacher Only (T_1) or Films Only (T_3) for facilitating acquisition of occupational skills for nonacademic vocational school bound students.

2. The Films Only (T_3) group demonstrated that they could learn a simple occupational skill at a level of proficiency almost equal to that achieved by the Teacher Only (T_1) group. This supports Roban's finding that in certain instances students can learn just as well from films as from a teacher.

3. The amount of teacher time given to repeated individual demonstration can be significantly reduced when class demonstrations are supplemented by SSCLF.

4. Students who are not motivated toward a given

trade do not respond in the same way toward SSCLF as students who are motivated toward that trade; nor is the performance level of non-motivated students improved by the presence of SSCLF.

5. There is no significant difference in the effectiveness of the SSCLF method for boys or for girls in the areas tested. SSCLF helped both boys and girls, but they tended to help boys more than they did girls.

Recommendations

From the information and experience gained from this study, the following specific recommendations for further study are made:

1. The silent single concept loop film method needs to be investigated across time and answers need to be found to such questions as:

How well will the method hold up for a complete year?

Will students seek out new tasks and new skills when not prodded into doing so by the instructor?

What about retention?

How many times can a cartridge be run under actual shop conditions before it wears out?

Are there storage problems?

How long will the projectors hold up?

What are some of the problems of cost that are involved in developing and using teacher-made SSCLF?

Is is feasible to set up an in-school program for teacher-made films?

To what extent can students be utilized for making instructional films?

To what extent can SSCLF implement differentiated staffing on the instructional level?

2. This study should be replicated in other shop areas, but the design should provide for replication of tasks and treatments within the study since this was not provided for in the present study. It would also seem desirable that replications provide for a larger number of teachers of both sexes and of varying levels of trade and teaching experience.

3. The silent single concept loop film method should be implemented in other programs throughout the state, particularly in commercial foods and baking inasmuch as many cartridges are now available in this area and are available for distribution through the New Jersey Vocational Curriculum Laboratory at Rutgers University, The State University of New Jersey.

4. Film making by master shop teachers in other occupational areas should be encouraged by administrators and supported by the state since it has been demonstrated that a shop teacher can make effective instructional films.

5. The effect of mental practice with SSCLF should be investigated along the lines of basic research

since this one factor can be controlled in a practical experimental environment.

Implications

It may be implied from this study that single concept loop films are simply another form of instructional material which teachers can make and use if encouraged.

It would also appear that to the extent that SSCLF can free the teacher from the need to make repeated individual demonstrations, his time can be more effectively used to provide better shop supervision and to give individual instruction to those students who need it most.

While it is not an implication of this study that teachers should be replaced by loop films, there are many locations where the need for training exists and where facilities are available but no trained teacher is employed. Examples of this are institutions of all kinds--particularly correctional institutions--in which the activities of many occupations are carried out. Schools also have a ready-made learning laboratory in the form of the cafeteria kitchen where young people can be trained for employment in the food industry.

To the extent that teachers will be less called upon for repeated individual demonstrations, there is

also an implication in this study that SSCLF will curtail teacher talk, which, as Amidon and Hunter (1966) have demonstrated, tends to have a negative effect on the teaching-learning environment. SSCLF may also foster indirect teacher influence which Nelson (1966) found was positively related to pupil achievement on written tests; and conversely, SSCLF may lessen direct teacher influence patterns which were found to inhibit pupils' development of written language skills.

It would also seem reasonable to suggest that where SSCLF is present the skills a student may acquire need not be limited to those which the teacher possesses, as is so often the case when, of necessity, inexperienced teachers are employed.

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APPENDIXES

APPENDIX A

PILOT STUDY ABSTRACT

A study was conducted investigating the relative effectiveness of single concept films as an adjunct to traditional instruction in manipulative shop skills. The segment of population samples consisted of male and female sophomore students enrolled in a commercial foods vocational course. The criterion of learning was quantitative performance on a posttest skill test in making roses with buttercream. The qualitative aspect was not defined, as this was a matter of compromise and agreement between each individual student and the teacher. Relative to the level of skill-attained criterion, adjunct single concept film instruction was found to improve performance significantly, and the results were discussed in relation to the performance variable. The expectation that single concept films would improve performance was confirmed.

APPENDIX B

PRELIMINARY STUDY #1:
NEW JERSEY RESIDENTIAL CENTER

The objective of this study was to observe student reaction to the specific loop films that would be used in the final study. Answers were sought to such questions as:

a. Just what kind of problems might a student run into in the "Films Only" condition?

b. Will students <u>want</u> to use films to learn the skills involved?

c. Can the films actually teach the skills they were designed to teach?

d. To what extent is an individual projector necessary for each student?

e. Will the <u>continuous</u> aspect of the loop film be objectional?

f. To what extent will the students use the "stop action button" on their own initiative?

g. Will students be interested in learning skills other than those in the experiment?

h. Will students' interest in the experiment wane within the three-day study?

i. How much time should be allotted to the practice and production sessions?

j. What logistical problems might arise in attempting to provide typical conditions before, during, and after the practice and production sessions?

k. What precautions must be taken in order not to interfere with the normal routine of kitchen personnel?

l. What special arrangements must be worked out with the administration and other personnel?

Tentative answers were found to many of these questions and the Residential Center preliminary study is described below:

Since it was not possible to work the experiment into the established exploratory program of the Residential Center and it would, instead, be necessary to recruit volunteers who were already enrolled in other shop areas, the investigator set up a projector and a small screen opposite the "chow line" at lunch time one day and ran about 50 different films covering various baking skills. Students passing through the line could then see the films for about five minutes. A large poster on an easel alongside of the screen said:

WOULD YOU LIKE TO TRY BAKING?
Special 3-day Course in Roll Making Offered Using These Films Begins Wednesday April 1.
LIMITED TO TEN STUDENTS.
SIGN UP HERE--NOW ONLY

While the comments on the line were enthusiastic and most of the students appeared to respond favorably to the film loops, only 10 actually signed up--and most of these were recruited by one foods student who really was interested and, who, when he learned that the experiment might not take place if 10 students did not sign up, began to talk up the program to his friends. This is mentioned to point out that while the subjects were volunteers, they were not particularly willing volunteers. Thus, self-selection was not a factor.

It was necessary for the investigator to set up a complete shop for this phase since the area that had previously been used for baking learners during the time the Job Corps used the facility was no longer in use as a learning shop. It had deteriorated to a kind of catch-all room for soda tanks, surplus equipment, etc. After cleaning the area, work space was set up for 10 students and one section of the room was cleared for a kind of classroom where students could be seated and oriented for the experiment and given an opportunity for group viewing of the film. Since individualization of instruction was one of the basic premises of the study, it was desirable that each student be provided with his own projector. However, only two projectors were available to the investigator at this time so the shop had to be

arranged so that each student would have the opportunity to watch the film while at his own work bench.

Each session began with a 10-minute group viewing of the film lesson for the day. Students were told: (1) they would be given no personal assistance; (2) they were to try to learn from the films alone; (3) the rolls they made would be served for the cafeteria lunch that day; (4) they should turn off the projectors when they were no longer needed; (5) that at the end of the 30-minute practice period there would be a 10-minute break, followed by a 30-minute production period; and (6) that each student was to record the number of rolls made during the production period and identify his pan so that he could see his rolls after they were baked.

The investigator had planned to:

1. Mix the dough before students arrived.
2. Show the film to the group.
3. Record data.
4. Take pictures.

The baker at the Center was to be responsible for baking the rolls and taking care of all production subtasks. All production details other than the actual manipulative skill involved in forming or shaping the rolls would have to be taken care of so that the forming or shaping skill itself could be observed. The important outcomes of this

preliminary study were:

1. Additional help would be needed to handle logistiatical details.

2. An observer would have to be employed and trained to make necessary observations and record the data.

3. Judges would be needed to evaluate the "acceptability" of the finished products.

4. Sufficient projectors would have to be procured to provide for individualized use.

APPENDIX B.1

REQUEST TO ASSISTANT DIRECTOR

March 23, 1970

Mr. Pat Doherty, Assistant Director
New Jersey Residential Center
Edison, New Jersey

Dear Mr. Doherty:

Attached is a copy of my doctoral proposal.

I shall begin to collect data for this study in New Jersey vocational schools beginning April 6, 1970. Before that date, however, I would like to conduct a small pilot study at the Residential Center to measure to what extent these single concept loop films are helpful to the student population here.

I am requesting permission to conduct this study with ten volunteer students in the room adjoining the bake shop during the mornings of March 30, 31, April 1.

Although you had suggested evening hours, I find after discussion with the teacher that the morning hours --and the use of the proposed space--would be more suitable.

Your cooperation will be greatly appreciated.

Very truly yours,

Cy Sommer

APPENDIX C

PRELIMINARY STUDY #2: ESSEX COUNTY VOCATIONAL-TECHNICAL HIGH SCHOOL, NEWARK, NEW JERSEY

This was intended as the Films Only treatment. After the first day, the investigator realized that additional preparation was necessary before valid data could be assembled. The three-day experiment was carried out in every detail as if it were an integral part of the study. Although data were gathered, they were not included as part of the study because (1) the Ss were not representative of the population with which the study was concerned, and (2) the observer was not ready to carry out the function of her dual role (teacher-surrogate and observer). As a result, the investigator found it necessary to answer student questions which was something he was not supposed to do.

The Newark site was originally selected because it met many of the requirements. There was an interested and capable teacher; the administration was interested in the experiment; and the physical facilities were perfect since the shop was already set up with individual stations, electrical outlets, etc. The valuable outcomes at Newark were: (1) the observer's skills as an observer were improved; (2) the investigator learned that it was

imperative that a baker be employed to mix doughs, pan the rolls, and bake the rolls rather than attempt to do this himself; and (3) logistical data details involved in setting up and working with individual projectors for each student were worked out. The experience gained at this site made it possible to conduct the remainder of the experiment successfully.

The following questionnaire was distributed to students by the teacher two days after the experiment was completed at the Newark school. No analysis of the data was undertaken but inferences may be drawn as to student reaction to the use of SSCLF from the tabulated responses.

Some student comments were:

"I thought the films were very useful and I think it help us to make the rolls better. I think if we had these films for each station and available to use, it would be better for us and we would understand it better and we would not bother our teacher as much as we do. But I think the films would be better if we had sound."

"To show all angles of the hands, their movement and how you move your hands. Also show variations of the product (different ways of doing it)."

"I liked it very much. It was very interesting and exciting. And I believe that Mr. Sommer makes the best yeast dough I've every tasted. And my mother and family and friends liked it. And as much as I dislike school I would love to relive that week again and again. Thank you Mr. Sommer."

APPENDIX C.1

TEACHER'S EVALUATION OF STUDENT BEHAVIOR

This form calls for information which only you are in a position to give. Your assistance will be very much appreciated.

Your responses will in no way affect either the student's office record or your own. Neither will your responses be revealed to the administration. Decisions to purchase or use loop films will not be influenced by your responses either.

All that this form seeks is your professional, objective, unbiased observations of changes in student interest, attitude, and accomplishment--if any.

Please check the appropriate answers with regard to each student--but if in doubt, leave it out.

COMPARING EACH STUDENT'S ACTIVITIES DURING THE PAST FEW DAYS WITH HIS OR HER ACTIVITIES IN THE PAST, WOULD YOU SAY HE OR SHE . . .

	Item 1			2			3			4			5			6		
Student	Stuck to job			Discipline problem			Engaged in shop-related conversation with other students			Engaged in non-shop related gossip			Found excuses to leave shop			Evidenced pride in accomplishment		
	M	L	S	M	L	S	M	L	S	M	L	S	M	L	S	M	L	S
1																		
2																		
:																		
12																		
Total	4		8	1		11	1	2	9	3		9	12			5		7

M = More, L = Less, S = Same.

APPENDIX C.2

NEWARK TEACHER'S STATEMENT

April 15, 1970

Mr. Cy Sommer
Department of Vocational-Technical
Education
Rutgers University
New Brunswick, New Jersey

Dear Mr. Sommer:

Since students rarely present discipline problems, I do not feel that this item means much (referring to Item 1).

Students did discuss this project outside of the classroom--showed enthusiasm for films.

Did hear comments of "being tired" on Wednesday--this could have had some influence on the results--(their physical exhaustion was a cumulative problem of too many hours on their feet--Telethon drive, etc.).

Students are normally not encouraged to move from one shop area to another for conversation--this activity has been discouraged so as not to interfere with shop production.

Less aggressive students seemed to concentrate more on film than those students who are extroverted normally.

Students showed enthusiasm and respect for Mr. Sommer. Having a man in shop could have had some influence on their behavior (giggling, girlish chatter); women (girls) seem to enjoy working for a man.

This project could be very beneficial to the student who has been absent--for review and learning new material--would be useful as a teaching aid to the instructor. Wonder about retention of material learned.

In reference to the teacher's evaluation:

"Stuck to job"--students realized the "specialness" of this particular project--would they be apt to have this working intensity if they were not competing with others in the group?

Absenteeism day following "reward" was back to normal proportions--4 out of 12 students who participated were out. Don't know what this signifies, if anything.

Students did seem to enjoy using film for making Challah (rope practice). Some students took braid home to practice this particular braid they had not worked with before. Maybe the uniqueness of the activity intrigued them.

Very truly yours,

Mrs. Patricia Skidmore

APPENDIX D

RAW DATA

At Thomas Edison Vocational School, Elizabeth, New Jersey

Treatment Group: Teacher Only (T_1) Date: 4/20-22/70

Ss		R_1 Buttons Judges J_1	J_2	R_2 Twists Judges J_1	J_2	R_3 Rounds Judges J_1	J_2	Total No.	No. OK
1	Total #	63	63	45	45	30		138	
	# OK	39	25	22	26	18			74.0
2	Total #	64	64	56	56	41		161	
	# OK	26	11	24	15	30			68.0
3	Total #	36	36	32	32				
	# OK	19	19	14	5				
4	Total #	53	53	60	60	36		149	
	# OK	38	40	26	28	26			92.0
5	Total #	39	39	33	33	77		149	
	# OK	22	11	16	5	55			82.0
6	Total #	45	45			93			
	# OK	21	31			64			
7	Total #	36	36	29	29	51		116	
	# OK	21	13	22	13	29			63.5
8	Total #	51	51	60	60	118		229	
	# OK	15	16	28	18	59			97.5
9	Total #	29	29	25	25	37			
	# OK	21	20	17	16	22			59.0
10	Total #	57	57	41	41	55		153	
	# OK	28	32	17	7	26			68.0

(continued)

APPENDIX D (continued)

Ss		R_1 Buttons Judges J_1	J_2	R_2 Twists Judges J_1	J_2	R_3 Rounds Judges J_1	J_2	Total No.	No. OK
11	Total #	65	65	46	46	107		218	
	# OK	25	30	20	5	44			84.0
12	Total #	56	56	60	60	80		196	
	# OK	19	21	29	23	38			84.0
13	Total #	63	63	54	54	103		220	
	# OK	40	52	27	25	55			127.0
14	Total #	27	27	41	41	100		168	
	# OK	23	21	21	16	32			72.5
15	Total #			29	29	32			
	# OK			16	7	20			
Total		603		550		835		1988	971.5

APPENDIX D (continued)

At Thomas Edison Vocational School, Elizabeth, New Jersey

Treatment Group: Teacher + Films (T_2) Date: 4/27-29/70

Ss		R_1 Buttons Judges J_1	J_2	R_2 Twists Judges J_1	J_2	R_3 Rounds Judges J_1	J_2	Total No.	No. OK
1	Total #	54	54	48	48	64	64	166	
	# OK	33	32	18	15	36	50		92.0
2	Total #	56	56	50	50	61	61	167	
	# OK	44	40	20	24	30	36		97.0
3	Total #	50	50	38	38	70	70	158	
	# OK	26	23	17	20	39	58		91.5
4	Total #	64	64	51	51	108	108	223	
	# OK	32	28	30	27	72	76		132.5
5	Total #	33	33	32	32	23	23	88	
	# OK	17	17	20	20	6	5		42.5
6	Total #	14	14			64	64	78	
	# OK	2	6			35	41		
7	Total #	71	71	74	74			145	
	# OK	38	39	37	40				
8	Total #	92	92						
	# OK	77	70						
9	Total #	103	103	72	72	150	150	325	
	# OK	63	67	33	42	92	123		210.0
10	Total #	108	108	82	82	138	138	328	
	# OK	69	65	31	28	76	93		181.0
11	Total #	50	50	41	41	65	65	156	
	# OK	42	41	23	29	39	53		113.5
12	Total #	49	49	69	70	39	39	157	
	# OK	42	44	41	47	21	28		111.5
Total		567		483		718		1768	1071.5

APPENDIX D (continued)

At Crossroads Junior High School, South Brunswick, New Jersey
Treatment Group: Films Only (T_3) Date: May 5, 6, 7, 1970

Ss		R_1 Buttons		R_2 Twists		R_3 Rounds		Total No.	No. OK
		Judges		Judges		Judges			
		J_1	J_2	J_1	J_2	J_1	J_2		
1	Total #	72	72						
	# OK	35	40						
2	Total #	41	41	35	35	52	52	128	
	# OK	25	30	28	28	41	36		94.0
3	Total #	38	38	22	22	36	36	96	
	# OK	22	22	20	16	21	16		58.5
4	Total #	48	48	30	30	54	54	132	
	# OK	35	34	24	24	36	41		97.5
5	Total #	43	42	44	44	56	56	143	
	# OK	25	26	32	29	44	44		101.0
6	Total #	52	52	36	36	47	47	135	
	# OK	27	30	27	21	20	17		71.0
7	Total #	56	56	64	64	58	58	178	
	# OK	31	26	54	48	46	44		129.5
8	Total #	68	68	54	54	128	128	250	
	# OK	40	48	44	40	93	95		180.0
9	Total #	44	44	55	55	109	109	208	
	# OK	27	32	39	43	68	63		136.0
10	Total #	40	39	72	72	91	91	203	
	# OK	17	27	57	42	59	46		124.0
11	Total #	62	60	40	40	69	69	171	
	# OK	18	12	20	18	45	36		74.5

(continued)

APPENDIX D (continued)

Ss		R_1 Buttons Judges J_1	J_2	R_2 Twists Judges J_1	J_2	R_3 Rounds Judges J_1	J_2	Total No.	No. OK
12	Total #	58	52	40	40	72	72	170	
	# OK	27	33	32	31	45	46		107.0
13	Total #	50	50	58	58	70	70	178	
	# OK	12	10	33	20	45	42		81.0
14	Total #	39	40	63	63	35	35	137	
	# OK	12	10	40	33	30	32		78.5
15	Total #	45	46	60	60	90	90	195	
	# OK	27	30	43	40	65	64		134.5
Total		684		673		967		2324	1467.0

APPENDIX E

INSTRUCTIONS TO TEACHER: T_1 AND T_2

4/22/70

1. Have students wash hands before starting. Give students sample roll.

2. No pretest. Simply ask if any of them have made this type of rolls before.

3. Inform them of schedule. Total time: two periods. First period for demonstration and practice. Second period for 20-minute production test. Remind students they will be allowed to take home the rolls made during the first period.

4. After that, during the production period, the rolls they make will be used in the cafeteria tomorrow. These rolls are to be panned in even columns and rows for easy checking by the judges. No more than 20 minutes. How many like the sample is the criterion rather just how many they make.

5. At the end of the 20-minute production period, have students turn in their rolls, fold their aprons, and leave.

APPENDIX F

LESSON PLANS: T_1 AND T_2

Title: How to Make Dinner Roll "Buttons" (First Day)

Objectives:

As a result of participating in this lesson, students will be able to shape the rolls in an acceptable manner, as judged by two persons representing the baking industry, the Executive Secretary of the New Jersey Bakers Board of Trade and a professional baker.

Materials and Preparation:

Sufficient dough for each student to make one practice press, and, after that, as much dough as students need to make as many rolls as they can during a 20-minute production period.

Pans, proofing boards, dusting flour, etc.

Sample rolls.

Students:

Vocational school bound ninth year students.

Presentation and Application:

Before the class assembles, the teacher will study the film loop on "How to Make Dinner Roll Buttons," in order that his presentation conforms with it. He will then present the lesson in whatever manner is usual for

him, but following the manipulative techniques in the film.

One period is allocated for his presentation. During this time, however, students must have the opportunity to practice the skill and make up one press of rolls each. These they can take home. After practicing, students have 20 minutes for production. During this time, the teacher is to give no further assistance.

Test:

At the end of 20 minutes, students are to deliver their pans, properly labeled, to the room where they will be judged.

Students should then clean up their work stations in the regular manner.

Note:

During this entire period, an Observer will walk around the shop and record student and teacher behavior.

* * *

How to Make Dinner Roll "Twists" (Second Day)

On the second day, the teacher will present the lesson on "How to Make Twist Rolls," following the above procedures.

How to Make Round Dinner Rolls (Third Day)

On the final day, the teacher will present the lesson on "How to Make Round Dinner Rolls," following the above procedures.

At the conclusion of the three-day treatment, students and teacher will be asked to fill out questionnaires relative to the study.

* * *

The lesson plan for Teacher + Film is the same as for Teacher Only, except that in Teacher + Film, (1) the teacher will begin the lesson with a group showing of the film and follow this with his demonstration; (2) projectors and films will be at the students' work stations for student use during the first period only; (3) students may not use the projectors during the test period; and (4) assist students individually where required, just as he had done in T_1.

APPENDIX G

INSTRUCTIONS FOR TEACHER-SURROGATE: LESSON PLANS FOR T_3

Title: How to Make Dinner Roll Buttons.

Time: Two consecutive periods. Within the first period, 20 minutes will be allocated to practice. Within the second period, 20 minutes for production.

Subjects: Vocational school bound eighth graders.

Objectives: After watching the loop film titled "How to Make Dinner Roll Buttons," and practicing for one period, students will be able, during the second period, to successfully perform the task of knotting pieces of dough into the shape of dinner rolls, known in the trade, as "buttons."

Teacher	Student
Preparation	Preparation
1. Teacher-surrogate (the Observer) will have participated in a briefing session and understands that her function is simply to monitor the class.	1. Students will be pretested only to this extent: They will be shown samples of the type of roll they are expected to make and

Teacher	Student
She is to give no assistance to students. 2. Investigator will prepare sufficient fresh dough to provide each student with at least 6 dozen one-ounce pieces. He, too, is to offer no assistance to students and is not to communicate with them at any time. Presentation The teacher-surrogate will say: "Mr. Sommer, who is a baker and an amateur movie producer, has made some movies which show how to make dinner rolls. He brought in films on three different kinds of rolls which you'll be able to use for the next three days. Not only that,	asked if they have every made this kind of roll before. If they have, their scores must be excluded. Application Students will first watch the films as a group for 10 minutes and discuss it freely among themselves. At the end of 10 minutes, each student will receive one "press" (2-1/4 lbs. of dough divided into 36 one-ounce pieces) for the 20-minute practice session. These will be baked for students to take home. Test: After the practice session, projectors will be removed and each student will receive another press

Teacher	Student
he's even made the dough for us. But he insists on two conditions: (1) After we all view the films together and I show you how the projector works, you use the films as if we were not here. In other words, you get no help from us. The only help you get is from the film or from each other. And (2), the other condition is that we divide these two periods into a Practice Session during which you may work with each other, correct any mistakes, or do anything you wish--and a Production Session, during which you will work alone and try to make as many rolls as you can like the sample. If you have any questions, please ask them now, because once	for the 20-minute production session. Students who need additional dough during the production session will be given another press immediately. Evaluation: While the film shows additional subtasks in roll making ("washing" the rolls with egg wash, and panning them) for the purpose of this study, only the single manipulative skill of forming the rolls is the factor being observed: the time involved in washing and panning is not a factor and this will be done by the baker. At the end of the production session, the judges will record the number of "acceptable units."

Teacher	Student
as start, you'll be on your own.	
The teacher-surrogate will then show the students the films and samples, and assign work stations. Students may then watch the film as many times as they wish and then proceed when ready to practice the task of making rolls.	

Second Day

Title: How to Make Dinner Roll Twists.

Procedure: Exactly the same as first day--except for type of roll.

Third Day

Title: How to Make Round Dinner Rolls.

Procedure: Exactly the same as first day--except for type of roll.

APPENDIX B

INSTRUCTIONS FOR BAKER

The objective of this study is to observe three different teaching methods.

Your responsibility is to provide the teacher and the students with uniform pieces of dough at the time they are needed and in the quantity they are needed.

The session is divided into two periods. During the first period, the teacher will demonstrate how to make one kind of roll. Then the students will have 20 minutes to practice. Each student will receive one piece of dough only. These will be placed close together by the student for washing, panning, and baking by you. These must be baked off before students leave.

After the 20-minute practice session, the production session will begin.

You should provide students with as many pieces as they can make up. The test is: How many acceptable rolls a student can make in 20 minutes. That's why you must have the pieces ready.

These rolls will also be placed close together for washing and baking by you--but these are to be used for tomorrow's lunch so they can be given proper proof and there is no rush on these.

However, every one of these pans must be judged separately by both judges before they can be washed and panned for baking. If they get overpanned, you will just have to handle them the best you can. Everything in this test depends on the judges having sufficient time to evaluate fairly.

Presses are to be scaled

3-1/2 pounds for Buttons--Monday

3-3/4 pounds for Twists--Tuesday

3 pounds for Round Rolls--Wednesday

Use the following formula for dough:

1 qt. cold water

1 oz. salt

6 ozs. sugar

6 ozs. shortening

6 ozs. eggs

6 ozs. milk powder

6 lbs. flour

3 drops egg color

yeast--approximately
2 ozs., depending on
time.

Size of batch will depend on "what the mixer will take." Probably not over 6 quarts. Dough temperature not over 81°F.

After everything is baked off, equipment, pans,

boards, and supplies must be put out of the way so as not to interfere with regular production of the cafeteria staff. Benches, mixer, etc., to be left in workmanlike manner.

o o o

The three teaching methods we are considering are:

1. Teacher only (no films).

2. Teacher + films.

3. Loop films only (no help from teacher, no from you, or from Mr. Bonnet).

APPENDIX I

SCHEDULE

New Jersey Reciprocal Center	March 28,31; April 1	Preliminary Study #1
Essex County Vo-Tech High School, Newark	April 13,14,15*	Preliminary Study #2
Thomas A. Edison Vo-Tech Elizabeth	April 20,21,22	
Thomas A. Edison Vo-Tech Elizabeth	April 27,28,29	
Crossroads Junior High South Brunswick	May 4,5,6	

*This treatment was originally planned as part of the study (T_1) but because we were not equivalent it was considered desirable that it be replicated. This was done at Crossroads Junior High. Furthermore, only one judge was present at Newark and many procedural details were still being ironed out. Therefore, while data were gathered at this site and the outcome was very satisfactory judging by student and teacher responses, this part of the experiment was considered "preliminary" and the data were not included in the results. One of the real values of the Newark preliminary was that it served in the training of the observer.

APPENDIX J

INSTRUCTIONS FOR OBSERVERS:
GIRLS ONLY

The following information applies only to the April 23 assignment.

Please try to arrive at the Girls' School no later than 12:40 p.m. so that we may have lunch with the teacher in charge and discuss the procedures that should be followed.

You may plan to leave at the end of the seventh period. (I believe this will be 2:45 p.m.)

Your responsibility is to make objective, quantifiable observations relative to:

1. How long and how much the loops are used by the students.
2. How well the loops facilitate learning.
3. Student attitude toward use of this instructional medium.
4. Teacher activity during the time students are in shop.

At the beginning of the session, the teacher will introduce you to the students as "a beginning teacher." She will explain that the notes you are taking are not "marks" but that you are making your own notes for your own use as a future teacher. She will also ask the girls to put

their names on the name plates at each station so that you may be able to address them properly (but, in fact, so that you may be sure to record the necessary information without difficulty).

You should pass each station only once within each five-minute period, recording tallies or notes as discreetly as possible. Time your tours so that you will make it from one end of the shop to the other in five minutes. Try to spend the same amount of time at each station. Make any comments on the back of the tally sheet after the students have left. Please be mindful of the necessity of keeping opinion separated from observation.

APPENDIX B

GENERAL INSTRUCTIONS FOR OBSERVER:
T_1, T_2, AND T_3

For the most part, your observations should be confined to the categories in the attached check list. Note that these constitute two clear-cut categories: one is concerned with specific objective data, i.e., how many times you actually see the instructor perform a specific act such as help a student, or how many students turn off the projector after a given time. The other category is concerned with less objective observations and may call for perceptions corresponding on your part such as what kind of remarks one student makes to another.

The sessions will be divided into two periods: a practice period and a production period. A separate "Observer Data Sheet" should be filled out for each period.

During the practice period, the teacher will assist the students individually. Be sure to make a tally for each assist. He will also reinforce the students verbally; tally these also.

However, during the production period, he is not supposed to assist physically or reinforce verbally. BE SURE TO RECORD ANY INSTANCES OF SUCH INTERACTIONS. ANY ASSISTANCE GIVEN BY THE OBSERVER IS ALSO TO BE ADDED IN

THIS CATEGORY.

Also, during the production period (which for our purposes might be called a test period), pay special attention to student comments and conversation and tally what you hear as task-related or non-task-related, or positive or negative comments.

Make four tours of the shop during both the practice and the production periods. A tour will consist of beginning at Station #1 and passing down the aisle past each station, and recording your observations at each station before moving on to the next station. During these tours, do not attempt to record comments verbatim. Only tallies are necessary at this point. Afterwards, add any snatches of conversation you may recall. Ideally, you should make one complete tour of the shop every five minutes and make one tally in each of Sections I and II. Section III calls for tallies of observations that you will make "out of the corner of your eye." That is, you are to note the teacher's activity and make a tally each time he physically assists an individual student.

As soon as the session is over, review your check list and add to it any student remarks you recall which reflect student attitude toward any aspect of the learning session just completed.

Please be sure to report to me immediately any

shortcomings in the physical setup which you may observe as being detrimental to the learning situation as well as any conditions in the present situation which contributes toward making this situation different in any way from any of the other situations. IT IS IMPERATIVE THAT ALL SITUATIONS BE ALIKE!!! THIS ASPECT OF THE STUDY CANNOT BE OVEREMPHASIZED. YOUR FULLEST COOPERATION IS ABSOLUTELY ESSENTIAL TO INTERNAL VALIDITY AND TO THE VALUE OF THIS STUDY.

Please reread these notes every day. And please plan to spend at least a half hour with me before and one hour after your check list is completed each day.

Thank you.

Cy Sommer

APPENDIX G.1

FORM G1: SUMMARY OF PERFORMANCE TESTS

School _____ Teacher _____
Date _____ Judges _____
Observer _____ _____

Student	Responses	Buttons	Delete	Sound	Total
01	Total #	#	#	#	
	# Acceptable	%	%	%	
02	Total #	#	#	#	
	# Acceptable	%	%	%	
03	Total #	#	#	#	
	# Acceptable	%	%	%	
04	Total #	#	#	#	
	# Acceptable	%	%	%	
05	Total #	#	#	#	
	# Acceptable	%	%	%	
06	Total #	#	#	#	
	# Acceptable	%	%	%	
.					
.					
.					
015	Total #	#	#	#	
	# Acceptable	%	%	%	
Grand Totals					

Buttons
Delete
Sound

APPENDIX H.2

FORM #2: OBSERVER'S TALLY SHEET

Student	Teacher reinforces		Student comments		Seems to enjoy task	Non-stop correc-tion	Task-related correc-tion
	Phys-ical	Ver-bal	+	-			
#1							
#2							
#3							
#4							
#5							
#6							
#7							
#8							
#9							
#10							
#11							
.							
.							
.							
#15							

Males_____ # Females_____ Grade Level____ Task___

PRACTICE: Starting time_____ Finished_____

PRODUCTION: Starting time_____ Finished _____

Number of projectors on at end of 5 ___, 10 ___, 15 ___, and 20 ___ minutes.

APPENDIX A

INSTRUCTIONS TO STUDENTS

As you know, teachers are constantly trying to improve instruction--not only in classrooms, but in shops as well. Constructive criticism from students can be very helpful. You have been brought here because, in part, we need your opinion.

During the next three days, you will be taught a number of new skills--all related to the food industry in which some of you will find your first jobs. You will be taught how to make a variety of dinner rolls. You will not be "marked." However, the number of rolls will be counted and we will let you know next morning how many were good.

Each session will be divided into two class periods:

During the first period, 20 minutes will be used for individual practice.

During the second period, 20 minutes will be used for individual production.

During the first period, you will make three dozen rolls. These will be baked so you may take them home. After that, during the 20-minute production period, you will make as many additional rolls as possible. These will be used for lunch in the cafeteria.

APPENDIX M

INSTRUCTIONS TO JUDGES

1. Judges should report for judging after students have finished the production session. However, before judging for the first time, both judges are required to take the "Judges' Evaluation Test." The purpose for this test is to establish:
   a. that both judges can consistently discriminate between "acceptable" and "not-acceptable" dinner rolls; and
   b. if there is interjudge compatibility.

2. Each judge will be given the test three times. The test will consist of picking out only the acceptable rolls from the sample of 36 rolls selected randomly from a population of 72 rolls. Unacceptable rolls will have been marked on the bottom with red dye. Judges will not at any time see the bottom of the rolls. First, judges will be shown samples of both kinds of rolls. The criteria for acceptability are as follows:

   Buttons:

   a. The student's roll is reasonably similar to the sample.
   b. The roll is reasonably uniform in shape and gives

evidence that the dough strip had been molded to uniform thickness.

c. Ends of the dough strip are neither too pointed nor too bulky.

d. Neither end of the roll protrudes in an unsightly manner.

Twists:

a. Roll is reasonably similar to the sample.

b. Roll has the required "figure-of-eight" shape.

c. Roll's twist pattern is the same as the sample.

d. Dough strip was of uniform thickness.

e. Dough ends do not protrude markedly.

Round:

a. Roll is reasonably similar to the sample.

b. Roll has obviously been molded tightly, rather than merely shaped into a soft roundish ball.

c. Roll gives evidence that it will probably rise into a round high ball rather than flatten out and rise only slightly.

3. Judging will be done "blind," i.e., the judges will not be told which treatment they are judging. Judges will not meet with the students whose work they are judging nor will they discuss any aspects of the study with the teacher. They will judge only the test pans of rolls which will be identified only with the student's station number.

APPENDIX H

CHECK LIST OF EQUIPMENT FOR EACH LOCATION

		Each Classroom (Lecture)	Casserole	Kitchen A	Kitchen B	Classroom
12	Projectors					
28	Cartridges--2 each Delete, Buttons, Round					
24	Aluminum Baking Pans					
12	Boxes (8" x 8" x 4") (for scraps)					
15	Boards (for production evaluation--one or more needed)					
1	Scale and Weights (for mixing dough and weighing process)					
150	Pan Liners					
12	lbs. Yeast					
50	1/8 Poultry Racks (for student take-home rolls)					
100	12" Cake Circles (to facilitate handling of dough)					
12	Extension Cords and 3/2 connectors					
3	Dough Bowls (for proofing dough)					
1	Bench Scraper					
2	Eggwash Brushes					
50	Foil Pans (for student take-home rolls)					
24	Student Towels					
	AGFA Camera and Film					
15	Paper Bats					
1	Dough Divider					
15	Student Aprons					
6	Bakers' Uniforms					
200	lbs. Flour					
10	lbs. Eggs					
10	lbs. Salt					
25	lbs. Sugar					
25	lbs. Milk Powder					
25	lbs. Shortening					

APPENDIX B

SUPPLIES LIST

The following supply list is predicated on an assumed need of five pounds of dough for each student for each day.

The formula for arriving at the total need is:

A x B x C = D

where A = the number of students (50)
B = the number of days per student (6)
C = pounds of dough per student per day (5)
D = total pounds of dough needed for entire study (1,500)

Total ingredients needed:		@	Cost
600	pounds of water		
12	pounds of salt	$0.03	$ .36
50	pounds of shortening	.25	12.50
50	pounds of eggs	.40	20.00
50	pounds of milk powder	.20	10.00
50	pounds of sugar	.12	6.00
50	pounds of yeast	.30	15.00
600	pounds of flour	.07	39.50
1,512			$123.36

APPENDIX F.1

QUESTIONNAIRE FOR STUDENTS:
ESSEX COUNTY VOCATIONAL HIGH SCHOOL
NEWARK, NEW JERSEY

(Students were junior and senior girls enrolled in Commercial Foods, N = 11)

Please do NOT sign this questionnaire. Answer all questions frankly. Simply circle the most appropriate word or letter below.

1. Were the skills demonstrated clearly enough for you to learn without additional help from the teacher?

   Yes 11 No ____

2. Which of the three films did you like best?

   a. Buttons
   b. Twists
   c. Round Rolls

   4
   7
   0

3. If you could have your choice, which would you prefer:

   a. To learn ALL new skills mostly from films, but with a teacher present you could call on if you needed additional personal help. 0
   b. To learn ALL new skills from teacher demonstration--but with films available if you needed additional help, or to refresh your memory. 9

4. Please check the items you DISLIKED about the films:

   a. They were too short. 1
   b. They were too long and repetitious. 2
   c. They went too fast. 3
   d. There were not enough written instructions. 4
   e. Films had to be run entirely to review a certain part. 5
   f. Should have had a sound track. 6

5. To what extent do you feel this method of instruction helped you concentrate?

   a. They helped me concentrate a great deal better. 6
   b. I concentrated about the same as when the teacher demonstrates. 4
   c. I concentrate better when the teacher demonstrates. 0

6. Did you discuss what you learned and how you learned with any of these:

   a. Friends outside of school 2
   b. Family 11
   c. Classmates and friends inside school 8

7. If you did not have to catch the bus to go home, and if films were available covering all the skills you used to have to be summarized in this course--but they would only be available after regular school hours,--do you think you might stay to see them?

   a. Never 0
   b. Always 3
   c. Once in awhile 9

8. If such films were avilable to you when you were a freshman, do you think you would:

   a. Be better prepared for employment. 12
   b. About the same. 0

PLEASE MAKE ANY ADDITIONAL COMMENTS YOU WISH ABOUT THE USE OF THE FILMS, YOUR FEELINGS ABOUT THIS WEEK IN SHOP, OR ANY THOUGHTS THAT OCCURRED TO YOU DURING THE WEEK, USE THE BACK OF THIS SHEET.

0 0 0 2 0 1 6 0

APPENDIX F.2

QUESTIONNAIRE FOR STUDENTS:
TRIMMED A. SMITH VOCATIONAL AND TECHNICAL HIGH SCHOOL, BILLERICA, NEW JERSEY

The following questionnaire was distributed to students in the T1 and T2 treatment groups by the investigator at the end of each three-day experiment. Student responses have been inserted.

DIRECTIONS: Please circle the answer that tells how you feel about your visit to this school . . . or . . . write in the answer where a write-in is called for.

You need not sign this questionnaire if you do not wish to.

1. What were your shop choices?

First choice_____
Second choice_____

	First shop choice	Second shop choice
Cooking	9	6
Beauty Culture	6	8
Carpentry	2	3
Cosmetology	0	1
Auto Shop	4	1
Radio	1	0
No choice (1)		

2. Did you enjoy coming here to learn those skills which are part of the Commercial Foods course?

Yes 22 No 0

3. If you did like it, what did you like best about it? (Write a sentence or two here.)

I like best making the twist rolls, butter rolls, and round rolls.

like to eat the rolls.

It's a change of scenery and experience.

I like it here because I like the school very much.

I like to learn how to make things.

Just to come.

I like the work. It was fun.

Seeing what I made.

I liked it. Was fun & learning.

Because I didn't want to go to my old school close.

Because I want to see what school was like.

4. If you didn't, what didn't you like about it?

The room was too stuffy.
(No other negative comments.)

5. Did your family like the sample rolls you brought home?

Yes	No	Family did not get any
11	0	0

6. Would you like to learn more baking and cooking skills?

Yes	No	Don't care
11	0	0

7. Do you think the teacher worked you too hard?

Yes	No
11	0

8. If members of the family did eat some of the rolls you brought home, what were some of the remarks they made?

They didn't have any remarks because I gave them out.

They were delicious and couldn't believe we made them.

You play hockey and bought them.

Their good. Bring home some more.

This is the goodest food I like.

They were good to be cooked by me.

9. Who said it?

Mother 14 Father 6 Sister 0
Brother 7 Aunt 8 Other Dogs 1

10. How do you feel about the "feedback slips" you got?

a. I thought I had done better. 0

b. I didn't think I had done so well. 0

(1 "good" or "OK")

11. On which day did you try the hardest to make good coils?

1st 12 2nd 6 3rd 11

12. Do you think the teacher gave you enough personal attention?

Yes 22 No 1

If you have any comments you wish to make, please feel free to do so on the other side.

I think it was wonderful because I know how to make it when I go to another school.
(No other student comments.)

Remember, you need not sign this questionnaire unless you wish to.

APPENDIX P.3

QUESTIONNAIRE FOR TEACHER:
THOMAS A. EDISON VOCATIONAL HIGH SCHOOL

1. With reference to those students who participated in the experiment, to what extent did their performance during the Single Concept Loop Film Treatment match your expectations?

   a. Students achieved about what I would expect. ___
   b. Students far exceeded my expectations. 7
   c. I was disappointed in students' achievement. ___

2. To what extent did the students appear to be intent on learning?

   a. A great deal ✓ b. Somewhat___ c. Not at all___

3. To what extent would you say that actual learning of new skills was taking place?

   a. A great deal ✓ b. Somewhat___ c. Not at all___

4. To what extent would you say that improved attitudes toward the school environment was taking place?

   a. A great deal ✓ b. Somewhat___ c. Not at all___

5. If you felt that, on the whole, the teaching-learning situation was successful, to which factor or factors would you attribute that success?

   a. The students were less anxious because they were in a homogeneous group. ___
   b. The skill was so simple that students could probably have learned just as well with traditional teacher demonstration. ___
   c. It was a new and novel situation. ___
   d. The film itself was a "good" piece of instructional material. ✓
   e. Other factors (please specify)_____
   _____

6. To what extent do you think such instructional materials could be helpful to a master teacher?

   a. A great deal ✓ b. Somewhat___ c. Not at all___

7. To what extent do you think that we may generalize as to the effectiveness of Single Concept Loop Films used with an Individualized Projector in shops other than baking?

   a. A great deal ✓ b. Somewhat___ c. Not at all___

8. To what extent do you think this instructional medium could be effectively used in the classroom if the development of suitable instructional materials depended on teacher development of materials during summer workshops?

   a. A great deal ✓ b. Somewhat___ c. Not at all___

9. Would you be interested in participating in such a workshop?

   Yes ✓ No_____

10. It is part of the rationale of my study that students with limited verbal skills learn better with silent rather than sound films. Would you say that the learning atmosphere that prevailed during the time you observed supported that rationale?

    a. A great deal ✓ b. Somewhat___ c. Not at all___

Please use the back of these sheets to pass along to me any student comments, both positive and negative, that you may have heard relative to learning with this instructional medium. I am not at all concerned with their enjoyment of the dinner rolls. I am concerned mainly with their enjoyment and success in using the Single Concept Loop Film medium.

Teacher's Comments:

"The first group of students worked without the single loop films. They worked only with instruction and demonstration by myself. The students performed and they produced rolls that were required of students who have never done any shop work before. A few dozen rolls were

good. The other rolls, if I had to grade them for step grades, would have been very low.

"The next group I had worked with the single loop films, instructions, and demonstrations. There was a great improvement in the finished product. About 60% of the rolls were better than good. The film strips showed how to make the product and when a student wanted to, he could stop the film to study a certain part of the film. I think the film strips did about 50% of my job. Also I didn't think the films were really going to be as good as they were. Another thing, I found that the instructor could use a set of these films to improve his lesson plans, and make instructions to students so much easier. I could write all day on this subject. I am 100% for this type of teaching."

(Signed)

James D. Vanbiotie

APPENDIX F.4

OBSERVING TEACHERS AT
CROSSROADS JUNIOR HIGH SCHOOL,
SOUTH BRUNSWICK, NEW JERSEY

The guidance counselor at the school where the three-day Films Only treatment took place sent a memo to all teachers asking them "to look in on the experiment that was taking place in the cafeteria." Afterwards, the following questionnaire was distributed in the mail boxes of all the teachers. A self-addressed stamped envelope was attached. No attempt was made to follow up non-respondents since it was not known how many teachers had actually observed the experiment or how many non-respondents knew enough about the individual students to make the kind of judgments the questionnaire called for. While there was not sufficient data for analysis, some inferences can be drawn from the tabulated responses.

APPENDIX F.5

QUESTIONNAIRE FOR TEACHERS:
CROSSROADS JUNIOR HIGH SCHOOL
(N = 20)

Fellow Teacher:

I know how limited your time is and I apologize for the length of this questionnaire--but your observations as a professional educator can be extremely valuable to my study which is aimed at the improvement of instruction for those youngsters who are not doing well in academic areas.

If you would take time to respond to the questions below, I shall be most grateful.

Cy Sommer

1. With reference to those students who participated in the experiment, to what extent did their performance during the Single Concept Loop Film Experiment match your expectations?

   a. Students achieved about what I would expect. 4

   b. Students far exceeded by expectations. 16

   c. I was disappointed in students' achievement. 0

2. To what extent did the students appear to be intent on learning?

   a. A great deal 18 b. Somewhat 2 c. Not at all 0

3. To what extent would you say that actual learning of new skills was taking place?

   a. A great deal 18 b. Somewhat 2 c. Not at all 0

4. To what extent would you say that improved attitudes toward the school environment was taking place?

   a. A great deal 12 b. Somewhat 6 c. Not at all 0

5. If you felt that, on the whole, the teaching-learning situation was successful, to which factor or factors would you attribute that success?

   a. The students were less anxious because they were in a homogeneous group. 0

   b. The skill was so simple that students could probably have learned just as well with traditional teacher demonstration. 0

   c. It was a new and novel situation. 10

   d. The film itself was a "good" piece of instructional material. 10

   e. Other factors (please specify): A very structured situation; already experienced; early recognized reward of learning (relief).

6. To what extent do you think such instructional materials could be helpful to a master teacher?

   a. A great deal 12 b. Somewhat 0 c. Not at all 0

7. To what extent do you think that we may generalize as to the effectiveness of Single Concept Loop Films used with an individualized Projector in stages other than baking?

   a. A great deal 12 b. Somewhat 0 c. Not at all 0

8. To what extent do you think this instructional medium could be effectively used in the classroom if the development of suitable instructional materials depended on teacher development of kits as during summer workshops?

   a. A great deal 10 b. Somewhat 2 c. Not at all 0

9. Would you be interested in participating in such a workshop?

   Yes 12 No 0

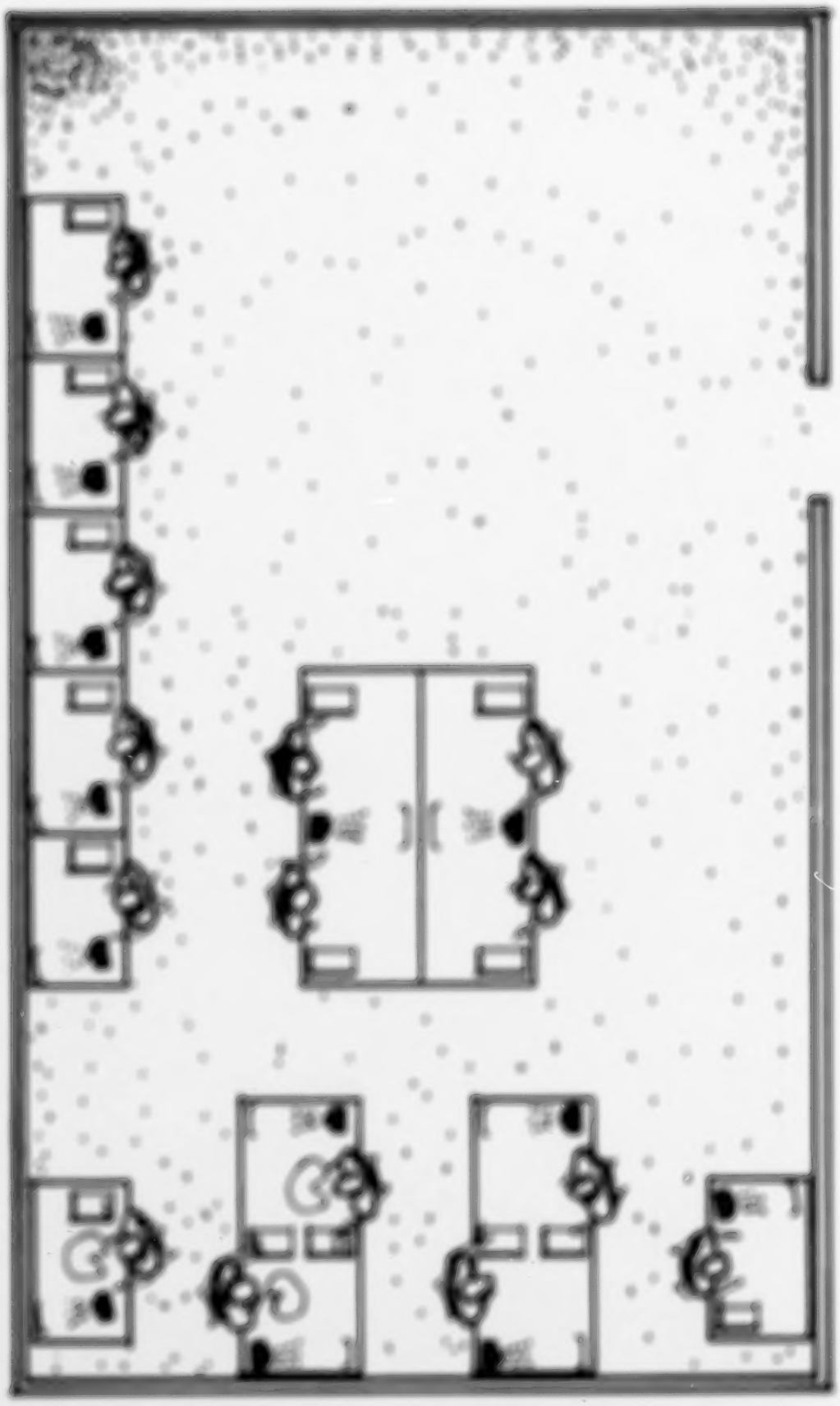
10. It is part of the rationale of my study that students with limited verbal skills learn better with silent rather than sound films. Would you say that the learning atmosphere that prevailed, during the time you observed, supported that rationale?

a. A great deal ___ b. Somewhat ___ c. Not at all ___

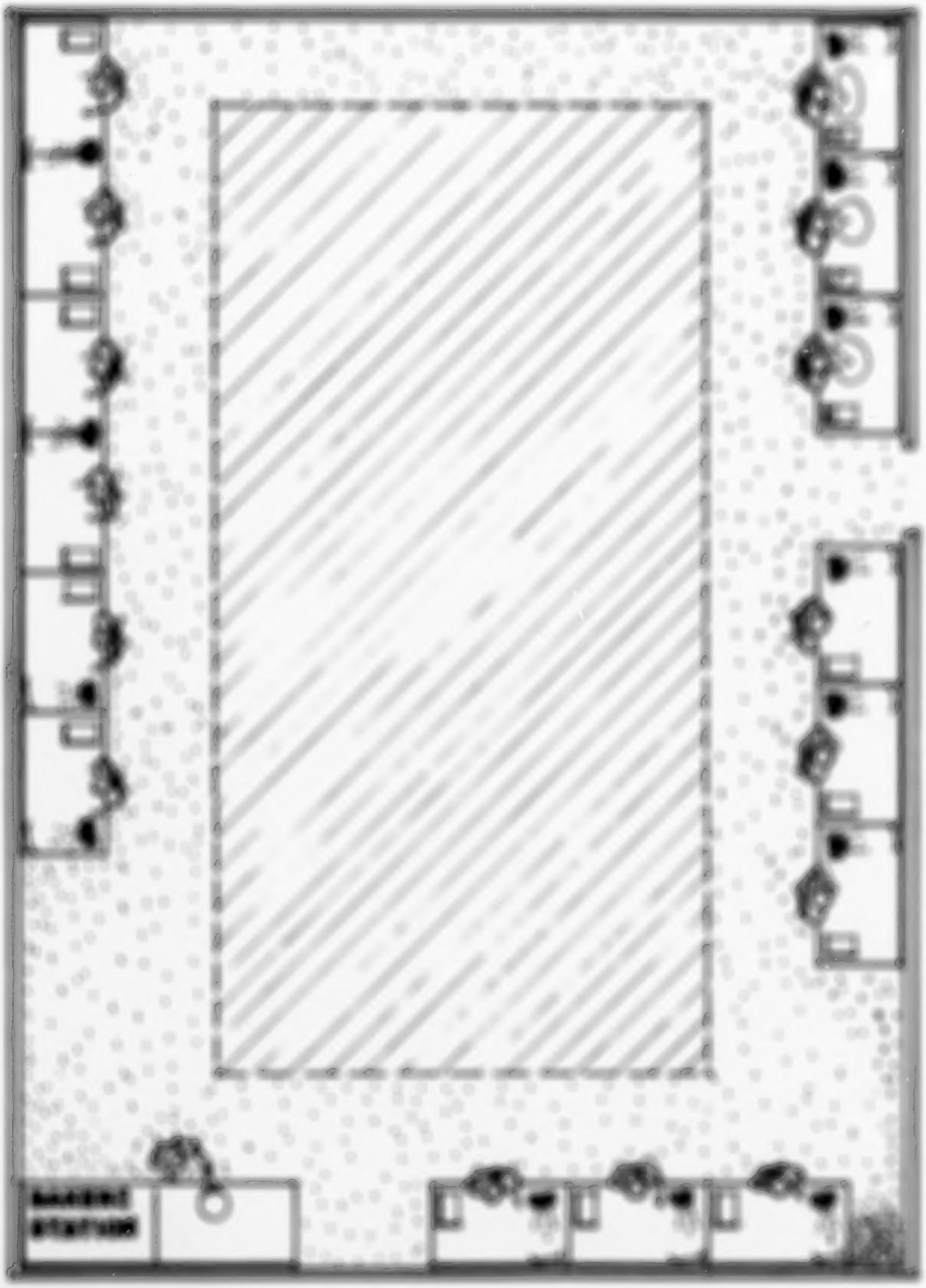
• • •

Please use the back of these sheets to pass along to me any student comments, both positive and negative, that you may have heard relative to learning with this instructional medium. I am not at all concerned with their estimate of the silent film. I am concerned solely with their enjoyment and success in using the single concept loop film medium.

_____
(Signature optional)



ROOM SIZE	40'-0", 20'-0"
BENCH SIZE	4'-0", 2'-6
TOTAL WORK STATIONS	18
TOTAL PROJECTORS	18



ROOM SIZE	65'-0" x 45'-0"
DESK SIZE	5'-0" x 2'-0"
TOTAL WORK STATIONS	18
TOTAL PROJECTORS	18

APPENDIX B

COMPUTER PROGRAMS

CLASS V - VARIANCE ANALYSIS METRIC DESIGNS 1969

BMD11V
ANALYSIS OF VARIANCE FOR FACTORIAL DESIGN

1. GENERAL DESCRIPTION

A. THIS PROGRAM COMPUTES AN ANALYSIS OF VARIANCE FOR A FACTORIAL DESIGN.

B. OUTPUT FOR THIS PROGRAM INCLUDES:

(1) ANALYSIS-OF-VARIANCE TABLE AND THE GRAND MEAN.
(2) A BREAKDOWN OF THE SUMS OF SQUARES INTO ORTHOGONAL POLYNOMIAL COMPONENTS FOR AS MANY AS FOUR MAIN EFFECTS AND ALL OF THEIR FIRST ORDER INTERACTIONS.
(3) MAIN EFFECTS AND FIRST ORDER INTERACTIONS FOR THE VARIABLE SPECIFIED IN (2).
(4) CELL AND MARGINAL MEANS.

C. LIMITATIONS PER PROBLEM:

(1) M, NUMBER OF VARIABLES OR KEYS (M LE 8)
(2) N, NUMBER OF REPLICATES (N LE 999)
(3) L(I), NUMBER OF CATEGORIES OR LEVELS OF ANY ONE VARIABLE (L(I) LE 999; AND L(1) * L(2) * L(3) *...*L(M) LE 10,000)
(4) K, NUMBER OF VARIABLE FORMAT CARDS (1 LE K LE 5)

D. THE PROGRAM CAN PERFORM TRANSFORMATIONS OF INPUT DATA, IF DESIRED, ACCORDING TO THE CODES SPECIFIED ON ONE SPECIAL TRANSFORMATION CARD. CODES 01 THROUGH 10 OF THE TRANSFORMATION LIST MAY BE USED.

2. ORDER OF CARDS IN JOB DECK

CARDS INDICATED BY LETTERS ENCLOSED IN PARENTHESES ARE OPTIONAL. ALL OTHER CARDS MUST BE INCLUDED IN THE ORDER GIVEN.

A. [illegible] CARD (INTRODUCTION, IV)

B. [illegible] CARD

(C.) [illegible] CARD (INTRODUCTION, III-B)

D. F-TYPE VARIABLE FORMAT CARD(S) (INTRODUCTION, III-C)

E. DATA INPUT CARDS
(PLACE DATA INPUT DECK HERE IF
DATA INPUT IS FROM CARDS.)

. . .

REPEAT B, THROUGH E, AS DESIRED.

. . .

F. [illegible] CARD (INTRODUCTION, III-D)

SAMPLE OF JOB DECK SET-UP:

F. /[illegible] [illegible] CARD

E. /DATA INPUT DECK

D. /F-TYPE VARIABLE FORMAT CARD(S)

(C.) /[illegible] SPECIAL TRANSFORMATION CARD

B. [illegible]
C. REPEATED
AS DESIRED

B. /[illegible] [illegible] CARD

A. / //ID [illegible] CARDS

3. CARD PREPARATION (SPECIFIC FOR THIS PROGRAM)

PREPARATION OF THE CARDS LISTED BELOW IS SPECIFIC FOR THIS PROGRAM. ALL OTHER CARDS ARE PREPARED ACCORDING TO INSTRUCTIONS IN THE INTRODUCTION.

B. PROBLEM CARD (ONE PROBLEM CARD FOR EACH PROBLEM)

COL. 1-6 PROBLEM (MNEMONIC)

COL. 7,8 PROBLEM NUMBER (ALPHAMERIC)

COL. 9-11 NUMBER OF REPLICATES (R LE 999)

COL. 12 NUMBER OF (VARIABLES) FACTORS (W LE 9)

COL. 13 1 IF SPECIAL TRANSGENERATION CARD FOLLOWS; BLANK OTHERWISE.

COL. 14 2 IF CELL AND MARGINAL MEANS ARE TO BE PRINTED;

1 IF ONLY MARGINAL MEANS A.E TO BE PRINTED;

IF NO MEANS ARE DESIRED, LEAVE THIS COLUMN BLANK.

COL. 15,16 NUMBER OF INPUT DATA FIELDS PER CARD. SEE THE DATA INPUT CARD SECTION BELOW.

COL. 17 NUMBER OF VARIABLES FOR WHICH AN ORTHOGONAL POLYNOMIAL BREAKDOWN IS DESIRED (LE 4). ONLY VARIABLES WITH NINE OR FEWER LEVELS MAY BE USED IN THIS BREAKDOWN. THE VARIABLES ARE SPECIFIED IN ASCENDING ORDER (SEE DATA INPUT CARD SECTION BELOW) IN THE FOLLOWING FOUR COLUMNS. IF NO BREAKDOWN IS DESIRED, LEAVE COLUMNS 17-21 BLANK.

NOTE: TO IDENTIFY VARIABLES BY NUMBER, REFER TO THE DATA INPUT SECTION.

COL. 18 1ST VARIABLE FOR ORTHOGONAL POLYNOMIAL BREAKDOWN

COL. 19 2ND VARIABLE FOR ORTHOGONAL POLYNOMIAL BREAKDOWN

COL. 20 3RD VARIABLE FOR ORTHOGONAL POLYNOMIAL BREAKDOWN

COL. 21 4TH VARIABLE FOR ORTHOGONAL POLYNOMIAL BREAKDOWN

COL. 22-24 NUMBER OF LEVELS OF THE 1ST ANALYSIS-OF-VARIANCE VARIABLE.

COL. 25-27 NUMBER OF LEVELS OF THE 2ND ANALYSIS-OF-VARIANCE VARIABLE.

COL. 39-40 NUMBER OF LEVELS OF THE 3RD ANALYSIS-OF-VARIANCE VARIABLE.

. . .

COL. 63-65 NUMBER OF LEVELS OF THE 27TH ANALYSIS-OF-VARIANCE VARIABLE.

COL. 66-68 BLANK

COL. 69,70 T NUMBER OF DATA INPUT TAPE. (0 LE T LE 20)

COL. 71,72 NUMBER OF VARIABLE FORMAT CARDS (1 LE R LE 5)

E. DATA INPUT CARDS

THE FORM OF THE DATA INPUT IS ILLUSTRATED IN THE FOLLOWING EXAMPLE, WHICH CONSISTS OF A THREE-VARIABLE DESIGN WHERE TWO VARIABLES HAVE THREE LEVELS, THE OTHER HAS TWO LEVELS, AND THE ENTIRE EXPERIMENT IS REPLICATED TWICE. THE DATA MAY BE REPRESENTED IN THE FORM:

X(R,I,J,K)	R = 1,2	(REPLICATES)
	I = 1,2,3 J = 1,2,3	(VARIABLES)
	K = 1,2	

THE PROGRAM CONSIDERS THE VARIABLE

I AS VARIABLE 1
J AS VARIABLE 2
K AS VARIABLE 3

IN PREPARING DATA FOR ANALYSIS, EACH REPLICATE OF THE DESIGN MUST START ON A NEW CARD. WITHIN EACH REPLICATE THE DATA ARE LEXICOGRAPHICALLY ORDERED BY THEIR SUBSCRIPTS. THAT IS, THE SUBSCRIPT ON THE RIGHT, NAMELY VARIABLE 3, IS INCREMENTED FIRST, THEN VARIABLE 2, AND FINALLY VARIABLE 1.

X(R,1,1,1)
X(R,1,1,2)
X(R,1,2,1)
X(R,1,2,2)
X(R,1,3,1)
X(R,1,3,2)

```
X(R,2,1,1)
  .
  .
  .
X(R,3,3,2)
```

THIS ORDER MUST BE MAINTAINED SINCE IT IS THE ONLY MEANS OF IDENTIFICATION OF THE DATA FOR THE PROGRAM. EACH DATA INPUT CARD MUST HAVE THE SAME FORMAT, AND THIS FORMAT MUST BE SPECIFIED ON THE F-TYPE VARIABLE FORMAT CARD. THE NUMBER OF DATA FIELDS PER CARD MUST BE SPECIFIED IN COLUMNS 15,16 OF THE PROBLEM CARD. UNUSED FIELDS, IF ANY, IN THE LAST CARD FOR EACH REPLICATE MAY BE LEFT BLANK.